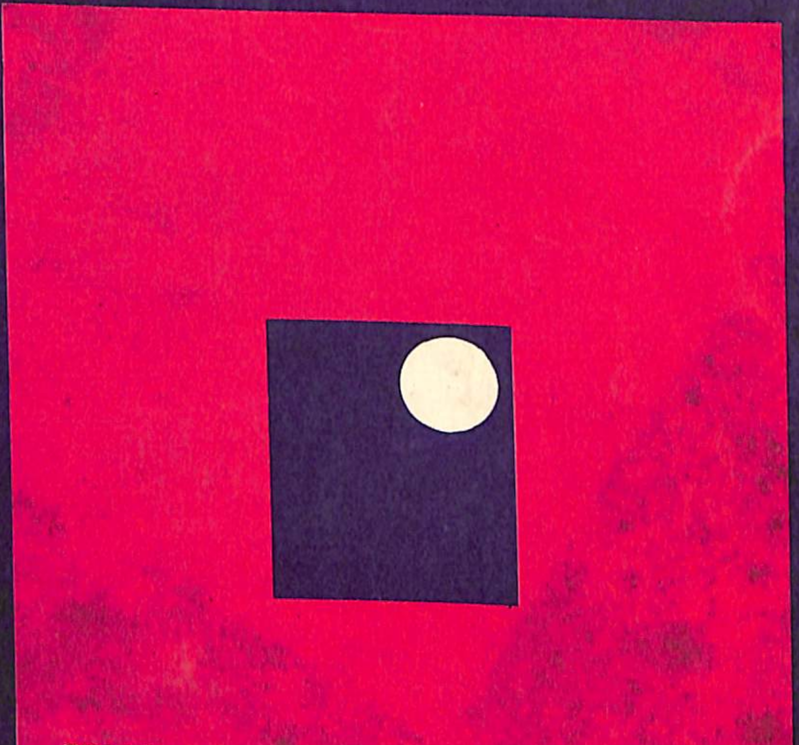
AN ELEMENTARY SCIENTIFIC AND TECHNICAL DICTIONARY



W.E. Flood
M. West

890

An Elementary
Scientific and Technical
Dictionary

829

PRONUNCIATION

The pronunciation shown is that current among English professional users of the word as it would be spoken in a sentence

i *as in* fit (fit) — ii *as in* feet (fiit)
e ,, ,, fed (fed)
æ ,, ,, fat (fæt)

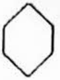
aa ,, ,, far (faa)
ɔ ,, ,, fog (fɔg) — ɔɔ ,, ,, fall (fɔɔl)
o ,, ,, obey (obei)
u ,, ,, foot (fut) — uu ,, ,, food (fuud)
ʌ ,, ,, fun (fʌn)
ə ,, ,, the reason (ðə riizən) — əə ,, ,, fur (fəə)

ai *as in* five (faiv) — aiə *as in* fire (faiə)
ei ,, ,, fate (feit) — eə ,, ,, fair (feə)
ɔi ,, ,, foil (fɔil) — iə ,, ,, fear (fiə)
ou ,, ,, foam (foum) — uə ,, ,, tour (tuə)
au ,, ,, fowl (faul) — auə ,, ,, sour (sauə)

ŋ *as in* long (lɔŋ)
θ ,, ,, thin (θin); ð *as in* then (ðen)
ʃ ,, ,, ship (ʃip); tʃ ,, ,, chin (tʃin)
ʒ ,, ,, measure (meʒə); dʒ *as in* judge (dʒʌdʒ)
j ,, ,, tube (tjuub), yoke (jouk)—a semi-vowel

Stress—The sign ′ comes **before** the stressed syllable, e.g. pro′nunci′ation—the stress is on ***-nun-*** and ***-a-***.

CHEMICAL SIGNS

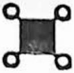
C	carbon	N	nitrogen
Ca	calcium	O	oxygen
Cl	chlorine	Zn	zinc
H	hydrogen	CO_2	carbon dioxide
		H_2O	water
C_6H_6 *or* 	For explanation see Benzene ring.	$2H_2O$	two molecules of water
		→	becomes, produces

For a complete table of the chemical elements and their symbols see Appendix (p. 411)

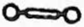
In explanations of the simplest chemical ideas the following five signs are used for the benefit of readers who are unaccustomed to chemical letter-formulae and prefer to think pictorially. Such readers may also find it helpful and interesting where ordinary chemical letter-formulae are given, to translate them into these figures:—

1. an atom of carbon: (it has a joining power of 4).

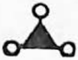
2. an atom of hydrogen: (joining power of 1).

 one carbon atom with four hydrogen atoms, CH_4.

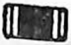
3. an atom of oxygen: (joining power of 2).

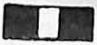
 HOH ($=H_2O$), water

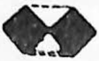
4. an atom of nitrogen: (joining power of 3).

 an atom of nitrogen with three hydrogen atoms, NH_3.

5. sometimes nitrogen apparently has a joining power of 5.

 here two oxygen atoms are doubly joined to a carbon atom, i.e. $O{:}C{:}O$.

 two carbon atoms doubly joined (as in ethylene $H_2C{:}CH_2$).

 so also three joins (as in acetylene $HC\vdots CH$).

For further explanation, see Valency.

An Elementary Scientific and Technical Dictionary

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PREFACE
TO THE THIRD EDITION

This dictionary, first published in 1952 under the title *An Explaining and Pronouncing Dictionary of Scientific and Technical Words*, is intended to help the general reader who seeks explanations of scientific terms which he may meet; it does not aim to provide delimiting definitions for the scientific expert.

In this revised edition the type has been completely reset. The opportunity has been taken to check the original text and to remove any errors or obscurities. About 250 new terms have been added, certain entries modified or extended, and a number of terms, which had little claim for inclusion in this book, eliminated. Some of the illustrations have been redrawn and a number of new ones provided. A full list of the chemical elements is now included as an appendix.

I am indebted to Mr. Nigel Calder, M.A., who selected the new items from the great number of new terms which have appeared in recent years and checked the explanations of them. He also made useful criticisms of the original text.

W.E.F.

PREFACE
TO THE FIRST EDITION

The authors set themselves the following rules:

1. Every explanation must be clear to a person who knows little or nothing about the particular subject, and must be made if possible with not more than one cross-reference (shown thus ↓) to any other explanation; but references to additional information may be given at the end. (*Entries were tested and rewritten as many as ten times to comply with this.*)
2. An example must always be given, and also a picture or diagram wherever it may be of any assistance.
3. Every explanation must be of such length as is necessary to give an adequate idea of the meaning (sometimes a page, or more, may be necessary); but this book is not an encyclopaedia; it deals with words not subjects.
4. Special attention must be given to word-elements (roots, suffixes, prefixes, etc.) so that the reader may be enabled to break up and interpret new scientific terms for himself.
5. Words should not be included which are adequately explained by an ordinary dictionary (but certain defining words are included).
6. No word may be omitted because it is too difficult to explain, but only because the explanation would take more space than is justified by its importance.

The explaining vocabulary used in this dictionary consists of about 2,000 words; 60 of these are definitely technical (see below). About 120 others might be unknown to a child or English-speaking foreigner; most of these 120 words are explained in the dictionary. For the benefit of the foreign reader certain bracketed explanations also are included in the text.

Acknowledgments are due to the following for their help in checking the correctness of this work: Mrs. R. Gunther (phonetics), Lt.-Commander John Anderson (nautical words), Peter West, M.B., B.S., D.P.H., D.C.H. (medical words), D. Thornton-Jones, M.P.S. (pharmaceutical words and general check); also to numerous Museums, Libraries, public institutions and commercial firms for supplying that pronunciation of words which is current among actual users of the words.

SCIENTIFIC TERMS

Before using this dictionary please look up in this dictionary any of the following words whose meaning you do not know. The more difficult words are printed in **heavy type**.

alkali/ne
alternating current
ampere
benzene ring
bond (chemical)
cavity (of the body)
cell (biology)
cell (electricity)
circuit
compound (chemical)
condenser (electrical)
conductor
direct current
electrode
electrolysis
electron
element (chemical)
equation
ferment (to, a)
field (magnetic, electric)
fossil
frequency (electrical, of waves)
generate (electricity)
gland (of body)
graph
hydrocarbon
induce (electricity)
insulator
ion
larva
mass (scientific use)
membrane
mica
molecule
negative (electricity)
neutron
nucleus (of atom, of cell)
orbit
organism
oxidise
parasite
pole (magnetic, electrical)
positive (electricity)
power (of a number)
protein
proton
quinine
radioactive
radium
resin
resistance (electrical)
salt (chemical)
seizure (= fit)
soluble, solution
spectrum
spore
storage battery
tissue (of living body)
valve (machine, radio)
volt

MEASURES:
Centigrade
Fahrenheit
gramme
metre
centimetre (cm.)
millimetre (mm.)

The sign ↓ means "Please see": e.g. ↓ watt means "Please look up the word *watt* in this dictionary."

For an explanation of the pronunciation, see inside the front or back covers.

A – chemical sign for ↓ argon.

α – Greek letter ↓ alpha ('ælfə).

a-/, an-/ – not, without, e.g. **a'morphous** (ə'mɔɔfəs) – without form or shape, not in crystal form.

A.C. – ↓ alternating current.

a.c. – ante cibum – (medicine to be taken) before food.

A.C.T.H. – adreno-cortico-tropic hormone – substance produced by the pituitary ↓ gland which causes the adrenal gland to produce ↓ corticosterone.

A.D.P., A.T.P. – ↓ adenosine.

A.P. – ↓ arithmetic progression.

A.U. – ↓ Angström unit.

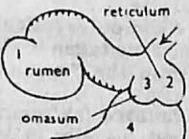
A.S.D.I.C. – ↓ Asdic.

A.W. – ↓ atomic weight.

ab'domen (æb'doumen) – (1) the part of the body below the lungs; it contains the organs with which food is digested and the organs of reproduction; (2) the third part of an insect body – head, thorax, abdomen.

ab'ductor (æb'dʌktə) – muscle which moves a limb outwards from the body.

'aber'ration ('æbə'reiʃən) – wandering away; (1) used of light when a lens does not bring all the light (e.g. of different colours) to the same point = **chromatic aberration**: or where the lens is not correctly curved and so bends part of the picture out of shape = **spherical aberration.** (2) When a man on the Earth is looking at a star he does not see the star where it really is: the star-light takes some time to reach him, and the Earth is moving: so he sees the star where it *was*. The difference between the seeming and the real place is the aberration.



ABOMASUM

'abo'masum ('æbo'meisəm) – the fourth stomach of a grass-eating animal, e.g. a cow; in it the main work of digestion is done.

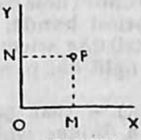
a'bortion (ə'bɔɔʃən) – producing young before the proper time and not completely formed. ***Contagious abortion** (kən'teidʒiəs-) – disease of cows caused by the organism *Brucella abortus*; it causes loss of the young animal in the 6th or 7th month: *(passed on, by touch, from one animal to another).

a'brasive (ə'breisiv) – substance used for rubbing away or polishing, e.g. sand, emery, Carborundum.

'abre'action ('æbri'ækʃən) – process, in the curing of mental disorder, in which the sufferer calls back to mind and faces some unpleasant memory which he is trying to forget.

'abscess ('æbsis) – an area of the body infected with bacteria; a collection of septic matter (bacteria and dead blood-cells), e.g. under the skin.

ab'scissa (æb'sisə) – The exact position of the point (P) can be described in map-making or mathematics by its distance from two lines at right angles: NP is called the abscissa (the cut-off part) and MP is the ordinate.



ABSCISSA

abscission layer – the layer of cells where the stem of a fruit (e.g. an apple) or a leaf breaks off from the branch.

'absolute ('æbsəluut) – perfect, pure, e.g. **'absolute 'alcohol** – pure alcohol with no (or very little) water in it.

'absolute 'magnitude (-'mægnitjuud) – "Magnitude" (= bigness) here means the rate of sending out light by a star (= its brightness). The **apparent magnitude** is the comparative brightness as seen from the Earth; but a bright star far away may seem less bright than one (really less bright) which is nearer. The absolute magnitude is the comparative brightness which the stars *would* have if they were all the same distance away.

'absolute 'unit – electrical unit (e.g. of current, pressure, etc.) which is based on the ↓ centimetre-gramme-second system. A practical unit (e.g. ampere, volt, etc.) is a multiple of the absolute unit.

'absolute 'zero – 0° C. on a centigrade thermometer is the temperature at which water freezes; but ice has some heat; e.g. ice is hotter than liquid air. At absolute zero there is no movement of the molecules and so no heat at all; −273·13° centigrade: ↓ K degrees.

ab'sorb (əb'sɔɔb) – take in; e.g. dry table-salt absorbs water on a wet day. The gas carbon dioxide is absorbed by water as in soda-water; heat and light are absorbed by a dark surface; sound is absorbed by a soft surface. **ab'sorption** – being absorbed, act of absorbing. When light passes through certain substances (e.g. a solution or gas) some of the colours which make up the light are absorbed so that there are dark lines or bands in the spectrum. These dark lines (called **absorption bands,** or **absorption lines**) tell the scientist what substance the light has passed through. ↓ *ad*sorb.

a'butment (ə'bʌtmənt) – that part of the end-wall of a bridge which supports the main beams or arch above.

a'byssal (ə'bisəl) – at a great depth in the sea.

acanthus (ə'kænθəs) – plant whose leaves are seen carved on the top of Greek and Roman pillars.

ACANTHUS

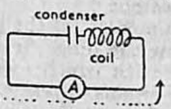
'acarus ('ækərəs) – mite = small spider-like creature. For picture ↓ scabies.

ac'cele'ration (ək'selə'reiʃən) – going or becoming faster, e.g. a thing falling down towards the Earth falls 32 feet per second faster in every second. If it starts from rest its speed is 32 feet per second at the end of the first second, 64 at the end of the second, etc.: its acceleration is 32 ft. per sec. per sec. So also acceleration of a car, bullet – or of a process, e.g. reproduction of bacteria, spread of chemical change through an explosive, etc.

ac'celerator – an instrument for changing speed (e.g. of a car); substance used to speed up a chemical change (e.g. calcium chloride, used to make cement solidify quickly; magnesium, aniline (and many other substances) used to speed up the vulcanizing (sulphur-hardening) of rubber); instrument for producing high-speed atomic particles.

ac'cele'rometer (æk'selə'rɔmitə) – instrument for measuring rates of change of speed (e.g. in ↓ inertial navigation).

ac'ceptor circuit (ək'septə 'səəkit) – An electric circuit (especially in radio) may contain a ↓ condenser and a coil as shown. If an electric current is started in this circuit it flows backwards and forwards round the circuit. The frequency of these swings depends upon the sizes of the condenser and the coil, so that the circuit has a *natural* frequency. *A* is a source of alternating voltage (electric pressure), e.g. from a radio aerial. Its power acts backwards and forwards at a certain frequency. If the frequency of the source is the same as the natural frequency of the circuit, a big current flows, and the circuit is an acceptor circuit for this particular frequency. When you "tune" your radio set, you make part of it an acceptor circuit for the frequency of a certain programme.

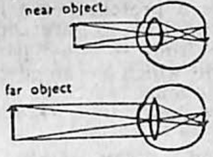


ACCEPTOR CIRCUIT

'access time – in a computer (calculating machine), the time taken to draw out a number from the "memory" section.

ac'cessory food factors (ək'sesəri) – substances in food (usually in very small amounts) which are necessary for health, e.g. ↓ vitamins.

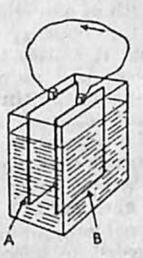
accommodation of the eye (ə'kɔmə'deiʃən) – changing the shape of the lens of the eye so as to see near or distant things.



ACCOMMODATION

a'ccoucheur (æ'kuuʃəə) – doctor who attends women in childbirth.

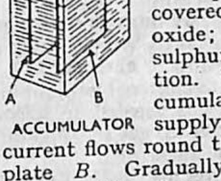
ac'cumulator (ə'kjumjuleitə) – electric storage cell, as in a motor-car for starting and lighting. In the common lead-acid accumulator, one plate, *A*, is lead, the other plate, *B*, is lead covered with lead peroxide; the liquid is sulphuric acid solution. When the accumulator is used to supply electricity, current flows round the circuit from plate *B*. Gradually both plates become alike (because of chemical changes) and the accumulator loses its strength. The accumulator can now be re-charged by passing a current in through plate *B*. ↓ Edison.



ACCUMULATOR

accumulator (hydraulic) – large container into which water is pumped for use later in driving machinery (e.g. ↓ hydraulic press).

ace'tabulum (æsi'tæbiuləm) – the cup-like place in the *pelvis into which the round top of the leg-bone fits: *(the big ring of bone at the base of the body).



ACETABULUM

acet'aldehyde ('æset'ældihaid) – $CH_3.CHO$, the ↓ aldehyde of acetic acid.

a'cetic acid (ə'siitik-) – The acid of vinegar is acetic acid (CH_3COOH) but pure acetic acid is colourless. **acetate** ('æsiteit) – a salt of acetic acid, e.g. lead acetate = sugar of lead, used in dyeing. **acetate rayon** – silk-like fibre made from ↓ cellulose acetate.

aceto'naemia ('æsito'niimia) – ↓ ketosis.

'acetone ('æsitoun) – a colourless liquid ($CH_3.CO.CH_3$) formed in the process of making alcohol. It is used to dissolve fats and resins; ↓ acetylene gas is dissolved in it for storing.

'acetyl ('æsitail) – the group of atoms, $CH_3.CO$– e.g. **acetyl chloride,** $CH_3.COCl$. **acetylsalicylic acid** = Aspirin.

'acetyl'choline ('æsitail'kouliin) – a chemical substance formed at nerve-endings; it carries over the nerve impulse from one nerve to another, or from nerve to muscle. Injected into the body, it causes activity of the ↓ parasympathetic system.

a'cetylene (ə'setiliin) – a gas which burns with a very white light; obtained from calcium carbide and water: $CaC_2 + 2H_2O \rightarrow C_2H_2$ (acetylene) + $Ca(OH)_2$ (slaked lime).

'achene ('ækiin) – *a-* = not, *chene* = split open): fruit with a thin covering (pericarp) close round the seeds. The pericarp is not fleshy or made of strong fibres, and does not open to let out the seed, e.g. a burr.

ACHENE

'achlor'hydria ('eiklɔɔ'haidriə) – lack of hydrochloric acid in the liquid of the stomach.

a'chondro'plasiac dwarf (ei'kɔndrou'pleisiæk) – a person with a full-sized body but very small arms and legs: (*a* = without; *chondro* = ↓ cartilage; *plasia* = growth).

'achro'matic lens ('ækrou'mætik) – lens which does not produce a coloured edge in its image; made by joining two lenses of different kinds of glass.

a'chromatin (æ'kroumətin) – substance in the nucleus of a cell which is not coloured by dyes.

'acid ('æsid) – substance with a sour, sharp taste which changes the colour of litmus dye from blue to red; when dissolved in water it gives one or more hydrogen ions H+. An acid (e.g. hydrochloric acid, HCl) is neutralized by an alkali (e.g. caustic soda, NaOH) to form a salt (e.g. sodium chloride, NaCl).

acid 'radical (- 'rædikəl) – a molecule of sulphuric acid is H_2SO_4. The group of atoms SO_4 is the acid radical. Similarly, nitric acid HNO_3; the acid radical is NO_3. Take away the hydrogen atoms which are replaced in the action of an acid, e.g. on a metal, and the acid radical is left.

'aci'dosis ('æsi'dousis) – a state of the body in which excessive acid is found in the blood.

a'clinic line (æ'klinik -) – a line near the equator where the compass needle does not dip towards the Earth.

'acne ('ækni) – scattered spots on the face and neck, especially of persons aged about 13 to 20.

'aconite ('ækənait) – drug obtained from the plant Monkshood, used chiefly to put on the skin to lessen pain; it is the most poisonous ↓ alkaloid.

a'coustic properties of a hall (ə'kuustik -) – the effect which the hall has on sound, so that people can (or cannot) hear well in it.

a'cquired character (ə'kwaiəd -) – change in the body of an animal or plant during life, e.g. because of disease or work or food, etc. ↓ hereditary.

'acri'flavine ('ækri'fleiviin) – yellow antiseptic made from coal tar; very powerful; its action is strengthened by the presence of blood ↓ serum.

acro-/ – top, furthest; e.g. **'acrocarpous** ('ækro'kaapəs) – having fruit at the end of the branch.

'acro'megaly ('ækro'megəli) – disease of the ↓ pituitary gland which causes the head, hands and feet to be very large.

a'cromion 'process (ə'kroumiən -) – the part of the shoulder blade which can be felt at the top of the arm, slightly to the back.

ACROMION

a'crylic resins, fibres (ə'krilik) – glass-like plastics (e.g. Perspex) which are made from acrylic acid, the simplest of the oleic acids (acids which form oils and fats): ↓ methylmethacrylate. **acrylic acid** – $CH_2{:}CH.COOH$.

'actin ('æktin) – a protein found in muscle fibre (in addition to ↓ myosin).

ac'tinic rays (æk'tinik -) – that part of the sun's light which has an effect on photographic films.

ac'tinium (æk'tiniəm) – a radioactive element.

'actino-/ ('æktino-) ("ray, star") – e.g. **'actino'morphic** – star-shaped. **'acti'nometer** – instrument for measuring the strength of sunlight.

'Actino'myces ('æktino'maisiiz) – a star-shaped fungus; it causes the damp smell of underground rooms, also of earth after rain. **ac'tinomy'cosis** – disease caused by Actinomyces or similar organisms; it produces hard swellings on the tongue in cattle; also called Woody Tongue.

'activated carbon ('æktiveitid -) – wood burned to charcoal without air; used (e.g. in gas masks) to a*d*sorb gases (= to take up gas by spreading it out over the surface).

activated molecule – ↓ excited molecule.

activated sludge (- 'slʌdʒ) – Sludge = the heavier part of drainage from a town (sewage) which sinks to the bottom. Activated sludge is sludge through which air is blown to help to purify it.

'active 'immuni'zation ('æktiv 'imjunai'zeiʃən) – giving protection against infectious disease by injecting dead or weakened living bacteria which have been made harmless, yet are still able to cause a protective reaction in the blood; e.g. vaccination. (**Passive immunization** – injecting a protective substance formed in the body of an animal, e.g. of a horse.)

active principle – that part of a medicine which has the effect (not the colouring or matter added for taste.)

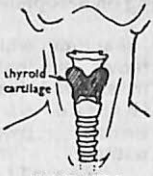
acu-/ (ækju-) – pointed like a needle; with a pin, e.g. **a'culeate** – covered with needle-like points. **'acu'puncture** – putting needles into the ↓ sciatic nerve to ease sciatic pain.

a'cute (ə'kjuut) – sharp, pointed.

acute illness – illness which appears very quickly (but not always serious).

-ad (æd) – e.g. **monad** = a thing which is single, e.g. a one-cell organism; an element with a joining-power (↓ valency) of 1: so also diad, triad, tetrad, pentad, etc. (2, 3, 4, 5, etc.).

Adam's apple ('ædəmz -) – the small outstanding mass in front of the throat of a man; caused by the thyroid cartilage (part of the larynx = voice-organ).



ADAM'S APPLE

'adap'tation ('ædæp'teiʃən) – changes made in the body-form or way of life of an animal (or plant) so as to be suited to a particular place or climate.

ad'dendum (ə'dendəm) – upper part of a gear tooth. ↓ pitch circle.

'Addison's disease ('ædisənz -) – weakness, low blood pressure, dark colour of the skin, caused by disease of the supra-renal ("above kidney") glands: ↓ adrenal.

'additive compound ('æditiv -) – compound made by joining together two substances, e.g. ethylene + chlorine → ethylene chloride: $C_2H_4 + Cl_2 \rightarrow C_2H_4.Cl_2$.

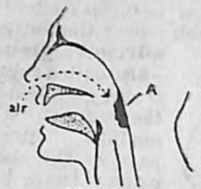
additive method of colour-photography – All the red parts of the photograph consist of very small dots; so also blue, green. Other coloured parts consist of mixtures of R.B.G. dots (e.g. purple = red and blue dots). So also colour television. ↓ subtractive.

additives – substances added to oil to give it some special quality, e.g. make it less sticky; substances added to food, e.g. to give colour.

ad'ductor muscle (æ'dʌktə -) – muscle which brings an arm (etc.) in towards the body.

'adenine ('ædeniin) – a chemical substance (a ↓ purine) in muscles; it is formed by the decomposition of ↓ nucleic acids.

/-ade'nitis (-ædə'naitis) – inflammation of a gland, e.g. **'lymphade'nitis** (limf-) – inflammation of the lymph glands.



ADENOIDS

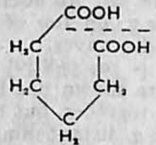
'adenoids ('ædənɔidz) – soft masses (↓ lymph glands) growing at the back of the nose and throat which if enlarged cause difficult breathing and hearing.

'aden'osine 'tri'phosphate (A.T.P.) – ('ædən'ousin -) – a substance in a living cell which stores energy and sets it free when it is changed into **adenosine diphosphate (A.D.P.)**. ↓ Krebs.

ad'haes-/, ad'hes-/ (æd'hiis) – stick (with glue, etc.). **adhesives** – substances used for sticking. **adhesions** – growth of tissue round a diseased or damaged part, e.g. the appendix: ↓ peritoneum.

'adia'batic ('ædia'bætik) – (*a* = not; *dia* = through; *batic* = going): (process) in which there is no passing in or out of heat. **adiabatic demagnetization** – method of reaching a very low temperature (e.g. below −272° C.) by allowing a magnetized crystal to become demagnetized under adiabatic conditions and so lose energy. **adiabatic expansion** – If a gas, compressed in a container, suddenly expands, it does so too quickly for heat to get in or out. (But energy is used in expanding; so the gas cools.) **adiabatic lapse rate** – the rate of fall of temperature of the atmosphere with height such that if a mass of dry air moves upwards and expands it cools at the same rate and so neither takes in nor gives out heat in its new position.

a'dipic acid (æ'dipik) – acid found in nature in beetroots (e.g. sugar-beet), made artificially from phenol, and used to make the plastic nylon (used for stockings).

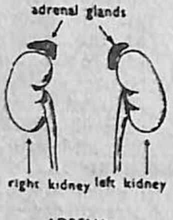


ADIPIC ACID

'adipose tissue ('ædipous) – fat (in the body).

Admiralty measured mile ('ædmirəlti -) – nautical mile (as in tests of speed of ships) = 6,080 feet.

ad'renal (æd'riinəl) – near the kidney.



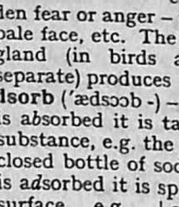
ADRENAL

adrenal glands – also called suprarenal; glands near the kidney. The medulla (inner part) of the gland pours into the blood a substance named **ad'renalin** (æd'renəlin) which produces those effects felt in sudden fear or anger – faster heart-beat, pale face, etc. The outer part of the gland (in birds and fishes quite separate) produces ↓ corticosterones.

'adsorb ('ædsɔɔb -) – When a gas (etc.) is a*b*sorbed it is taken into another substance, e.g. the gas absorbed in a closed bottle of soda-water; when it is a*d*sorbed it is spread out over the surface, e.g. ↓ activated carbon adsorbs gas (as in gas-masks used during the war).

'adven'titious ('ædven'tiʃəs) – coming by accident, not in the regular place or at the regular time, e.g. adventitious roots of plants – not growing from the existing root but from somewhere else.

adze – axe with the blade crossways to the handle, used e.g. in boat-building.



ADZE

aer-/ – air, e.g. **'aerate** ('eiəreit) – force air or gas into, e.g. **aerated waters** = soda-water, lemonade, etc., which give out bubbles when the bottle is opened.

'aerial ('eəriəl) – of the air. **an aerial** – a wire put up (e.g. on top of a house) to receive radio waves.

aerial pers'pective (- pəs'pektiv) – distance in a picture shown not by lines coming nearer together, but by differences of light, e.g. distant things less clear and more blue.

aerial root – root of a plant formed on a stem and used (chiefly) for climbing.

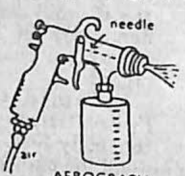
aero-/ (eərou-) – air, e.g. **'aero'batics** (- o'bætiks) – movements made by an aeroplane to show the skill of the pilot.

'aerobe ('eəroub) – organism which can only live in air.

'aerody'namics ('eərodai'næmiks) – study of the forces which act on (or are caused by) gases, especially the forces of the air acting on aeroplanes.

'aerofoil – ↓ air-foil.

'aerograph (- graf) – machine which blows out paint in a cloud (used instead of a brush); (trade name.)



AEROGRAPH

'aerolite (- lait) – a stone from outer space which falls through the air on to the Earth.

'aero'nautics (- 'nɔɔtiks) – the science of flight (by aeroplane, etc.).

'aerosol (- sɔl) – very small drops of a liquid (or pieces of solid matter) suspended in the air, e.g. a mist, fog, smoke.

aes'thesia (iis'θiiziə) – power of feeling; an **'anaes'thetic** ('ænis-'θetik) – substance which takes away the power of feeling, e.g. chloroform; **a local anaesthetic** takes away the power of feeling pain in one part, e.g. a tooth to be pulled out; a **general anaesthetic** causes unconsciousness. ↓ hyper-/.

ae'stival (iis'taivəl) – of summer.

aether – ↓ ether.

'aeti'ology, etiology ('iiti'ɔlədʒi) – study of the cause of disease.

'afferent nerve ('æfərənt -) – nerve carrying messages in towards the brain and spinal cord.

af'finity (ə'finiti) (chemical -) – the force which holds atoms together in molecules.

'after-birth – the placenta (organ of the mother from which the unborn child get sits food and oxygen) which comes out from the mother after the birth of the child; with it comes the inside lining of the uterus (organ in which baby is formed). These two form the after-birth.

'after-damp – the poisonous gas left in the air in a coal-mine after an explosion.

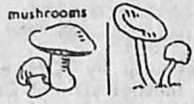
'after-image – If you look at a bright thing for some time and then look away at a white wall, you still seem to see the thing – but differently coloured: this is an after-image.

'aftermath ('aaftəmæθ) – grass which grows after the first lot of grass has been cut.

Ag – chemical sign for silver.

'agar-'agar ('eigə-'eigə) – a jelly made from sea-weed used in making substances on which bacteria are grown in the laboratory.

'agaric ('ægərik -). **A'gari'cales** (-'kaaliiz) – class of fungi which contains mushrooms (eatable) and toadstools (poisonous).



AGARIC

'agate ('ægət) – very hard stone with coloured lines in it; naturally grey but often artificially coloured: used for ornament, also where great hardness is needed, e.g. in mortars used for grinding material to powder.

ageing, age-hardening – Certain metal-alloys (e.g. duralumin, an alloy of aluminium with copper etc.) become hard some hours or days after they have been heated and then quenched (cooled, e.g. in water). In the case of duralumin, $3\frac{1}{2}\%$ of the copper separates out from the aluminium and so forms roughness in the layers of molecules in the metal; this prevents one layer from sliding over another and thus makes the metal hard.

'Agene ('eidʒiin) – trade name for nitrogen trichloride used for Agenizing flour (= treating flour with nitrogen trichloride to make it whiter and to cause a larger and lighter loaf). Agene causes attacks of nervous excitement in dogs (canine hysteria). The effect on man is not fully known.

'Agfacolor ('ægfəkʌlə) – system of colour photography using three light-sensitive films fixed to one celluloid base. These films are blue-sensitive, green-sensitive, and red-sensitive. The system is ↓subtractive. The films contain substances which combine with the developer to produce a suitably coloured image in the film: (trade name).

ag'glomerate rock (əg'lɔmərət -) – rock made of large pieces of stone set in a hard mass of ash, found in or near volcanoes.

ag'gluti'nation (ə'gluutin'eiʃən) – sticking together into small masses, e.g. bacteria or blood-cells agglutinate when in a body-liquid which is poisonous to them. This is used as a test whether the blood of a certain healthy person may safely be transfused into a sick person. ↓blood groups.

'aggregate ('ægrigeit) – (1) total, all added together; (2) closely packed; (3) mass of pieces all of the same kind and size; (4) mass made of broken pieces of rock. **aggregates** – sand and stones which are mixed with cement to make concrete for building.

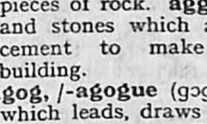
-agog, /-agogue (gɔg, goug) – that which leads, draws out, causes the production of, e.g. **'lactagog, 'lactagogue** – substance which causes an animal to produce milk.

a'gonic line (ə'gɔnik) – line drawn through places (on a map) where a compass points exactly true north (not slightly east or west of north): ↓declination.

'agora'phobia ('ægərə'foubiə) – fear of being in a large open space.

'agri-/- ('ægri-) – field, e.g. **'agriculture.**

'ailerons ('eilərɔnz) – movable edges on the wings of an aeroplane used to make one wing go up and the other down, e.g. in turning.



AILERON

'air-con'ditioning – making air just right for use in a building, by cleaning it, drying it (or adding water) and making it warmer or colder.

'air-foil (- fɔil) – any surface used to hold an aeroplane up or change its direction, e.g. wings, rudder, elevator.

'air-frame – the whole of an aeroplane without the engine.

air glow – faint light given out by the air due to physical and chemical processes taking place in the upper atmosphere.

'air-lock – (1) An air bubble in a pipe from which liquid is being drawn breaks the line of liquid and so stops the flow: it causes an air-lock; (2) a room between the open air and the compressed air, in a caisson (container in which men work under water): in the air-lock the pressure is raised till it is equal to that in the caisson; the door into the caisson can then be opened: for picture, see Caisson.

Al – chemical sign for aluminium.

ala-/ (ælə-) – wing. **alate** ('æleit) – having wings.

al'bedo (æl'biidou) ("whiteness") – measure of the power of a surface to reflect light, e.g. the albedo of the planet Jupiter is 0·44; that is, it reflects $\frac{44}{100}$ of the light which falls on it.

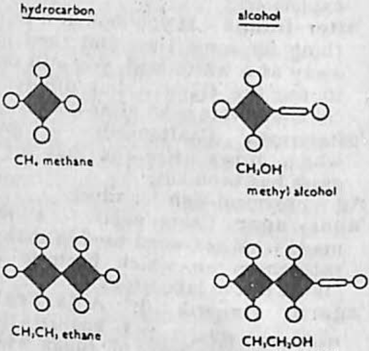
al'bino (æl'biinou) – person (or animal) who has not got the usual dark colouring matter in his (its) body; the hair is white, the eyes pink and not able to bear strong light. **Albinism** ('ælbinizm) is more common among dark races than among others. It is inherited, although the parent may not show albinism him (her) self.

al'bumen (æl'biumen) – (1) the clear white substance in an egg; food-material (↓endosperm) in certain seeds; (2) = albumin. **al'bumins** (æl'biuminz) – simple proteins such as that of white of an egg; they are soluble in pure water and become solid with heat.

al'buminoids (æl'biuminɔidz) – substances like albumins, but not soluble; hair and nails are made of albuminoids. **al'bumi'nuria** (- 'niuriə) – albumin in the urine, usually a sign of disease of the kidneys.

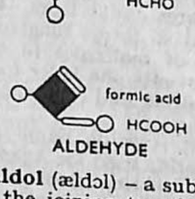
al'burnum (æl'bəənəm) – the new growing wood of a tree through which sap (juice) is passing.

alcohols ('ælkəhɔlz) – See hydrocarbon. An alcohol is a hydrocarbon with one or more hydrogen atoms of the molecule replaced by –OH; e.g. methane CH_4, methyl alcohol CH_3 OH; ethane $CH_3.CH_3$, ethyl alcohol $CH_3.CH_2OH$. Ordinary alcohol, as in wine, beer, etc., is ethyl alcohol.



ALCOHOLS

'aldehyde ('ældihaid) – a compound consisting of a —CHO group of atoms joined to a hydrocarbon group. It may be oxidized (have oxygen added to it) to become an acid (...COOH). **acetaldehyde** —CH_3CHO; **formaldehyde** (used to harden leather and as an antiseptic), H.CHO.



ALDEHYDE

'aldol (ældɔl) – a substance formed by the joining together of two ↓aldehyde molecules, e.g. $CH_3.CHO + CH_3.CHO \rightarrow CH_3.CHOH.CH_2.CHO$

a'leurone grains (æ'liuəron -) – small pieces of protein which serve as a store of food in plants, especially in the seed.

'Alfol ('ælfɔl) – trade name for thin sheets of aluminium bent so as to make many small air spaces, used to keep heat in (or out).

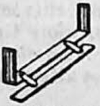
/-alg-/ – pain, e.g. **neur'algia** – pain in a nerve; **'anal'gesic** – a substance which lessens or prevents pain.

'Algae ('ældʒii) – plants which have no flowers and no true roots, though some (e.g. sea-weeds) have a part which holds them down onto a rock. They contian chlorophyll (substance by means of which plants make sugar from carbon dioxide and water). Some algae are very small, e.g. ↓diatoms; others, e.g. sea-plants, are very large. The microscopic algae found, e.g., in standing water swim about yet contain chlorophyll.

'alginates ('ældʒineits) – substances obtained from a seaweed, used, e.g., in making ice-cream, face-cream, fireproof materials and artificial silks.

'alge'braic sum ('ældʒi'brei.ik) – addition taking notice of the plus and minus signs, e.g. the algebraic sum of $+5, -3, -2, +2$ is 2 (not 12).

'ali'dade ('æli'deid) – ruler with an upright at each end, used to draw a line from a point on the paper towards some object (e.g. tree) on the land being mapped.

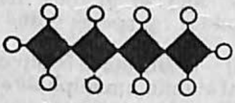


ALIDADE

a'lignment charts (ə'lainmənt) = ↓nomographs.

'ali'mentary ('æli'mentəri) – having to do with food. **alimentary canal** – the whole length of the pipe from mouth through the digestive organs to where the matter leaves the body.

'ali'phatic compounds ('æli'fætik) – carbon compounds made of a chain of atoms (not of rings like benzene); e.g. methane CH_4; ethane, $CH_3.CH_3$; butane, $CH_3.CH_2.CH_2.CH_3$. Other examples: ↓acetic acid, ↓acetone, ↓acrylic acid.



$CH_3CH_2CH_2CH_3$ butane

ALIPHATIC

'aliquot part ('ælikwɔt -) – part (fraction) of a quantity such that the quantity contains an exact number of these parts, e.g. 2 of 10, but not 3 of 10.

a'lizarin (æ'lizərin) – important red dye, once obtained from madder root, now made from anthracene (from coal).

'alkali ('ælkəlai) – (loosely) a substance (e.g. soda) which acts against and neutralizes an acid; (properly) a substance (e.g. caustic soda, a ↓hydroxide of an alkali metal) which dissolves in water and forms hydroxyl ions OH^-.

alkali metals – potassium, sodium, lithium, rubidium, caesium.

'alkanes ('ælkeinz) = ↓paraffins.

'alkaloids ('ælkəlɔidz) – a group of substances (organic ↓bases) obtained from plants, e.g. nicotine (from tobacco), hyoscine (datura), cocaine, quinine, morphine, strychnine. They all have important effects on the human body; their use to the plant is not exactly known.

'alkyl ('ælkil) – A radical (root) is a group of atoms which remains the same in different compounds of the same class. The alkyl radicals are the roots of the ↓aliphatic hydrocarbons (chain compounds of carbon and hydrogen), e.g. hydrocarbon, CH_4, radical CH_3–. **'alky'lene** – a hydrocarbon radical with a joining power of 2, e.g. ethylene: $-CH_2.CH_2-$.

al'lelomorphs, al'leles (æ'liilo-mɔːfs, æ'leilz) – opposite characters in inheritance, e.g. tall-short, smooth-wrinkled (peas); the genes (parts of cell) which carry such characters. ↓Mendelism.

al'lergic (ə'ləədʒik) – over-sensitive to a certain protein; e.g. a person who is allergic to white of egg becomes ill if he eats even a very small amount of it. **'Allergy** may also be produced by breathing in a substance. Some people are allergic to insect-bites, horse-hairs or to the pollen of certain plants. ↓anaphylaxis, hives, histamine.

'allo- ('ælo-) – other, e.g. **'allo'morphous** – made of the same substance but having a different crystal form.

"all or none" – the law which says that a single nerve fibre either acts fully, or not at all; it does not act weakly or more strongly. (The body, as a whole, acts less or more strongly, e.g. in taking away a finger from a hot thing, because fewer (or more) nerve fibres are used.)

'allo'tropes ('ælo'troups) – different forms of an element, e.g. diamond, graphite, charcoal are **allotropic** forms of carbon.

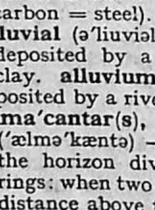
'alloy ('ælɔi) – two or more metals mixed or combined to make a substance which is different from (and more useful than) the pure metal, e.g. copper + tin = bronze. (Sometimes an alloy contains a substance which is not a metal, e.g. iron + carbon = steel).

al'luvial (ə'liuviəl) – which has been deposited by a river, e.g. alluvial clay. **alluvium** – a substance deposited by a river.

'alma'cantar(s), 'almu'cantar(s) ('ælmə'kæntə) – circle(s) parallel to the horizon dividing the sky into rings: when two stars are at the same distance above the horizon they are in the same almacantar; (2) form of telescope used for seeing the altitudes (heights above the horizon) of stars.

'alo'pecia ('ælo'piisiə) – baldness, lack of hair on the head. **alopecia 'are'ata** (- 'æri'aatə) – loss of hair on small areas of the head (often due to over-work or anxiety).

al'paca (æl'pækə) – camel-like animal in S. America. It has long silk-like hair. **alpaca cloth** – cloth used especially for the lining of coats, made from cotton lengthwise threads and alpaca or other fine wool cross-threads.


ALPACA

'alpha particle ('ælfə -) – (α, first Greek letter). When some radioactive materials (e.g. radium, uranium, plutonium) break up, they send out particles carrying ⊕ (positive) charges; these are called alpha particles. An alpha particle is the same as the nucleus of the ↓helium atom.

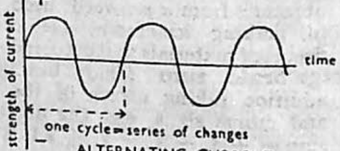
alt-/ – height, e.g. **al'timeter** (æl'timitə) – instrument used for measuring height.

alt'azimuth (ælt'æziməθ) – telescope which can be turned upwards or in a circle sideways, used to measure angles in the sky.

'altitude of a star ('æltitiud) – the angle showing the height of a star in the sky.

'alto-'cumulus cloud ('ælto'kjumjuləs) – ↓cumulus cloud 10,000–20,000 feet up.

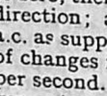
'alternating current ('ɔltəneitiŋ) – an electric current which first increases to a maximum (greatest strength) in one direction, decreases to zero, then increases in the opposite direction; and so on. In ordinary a.c. as supplied to a house, this series of changes is made 50 or more times per second. **alternator** – an electric generator which produces alternating current.



ALTERNATING CURRENT

'alter'nation of generations – reproducing first sexually and then asexually (not sexually) in turn: e.g., ferns reproduce by spores (little pieces of living matter able to grow into a new plant). The little plants which grow from these spores reproduce sexually (joining of male and female cells) and so produce ferns which reproduce by spores – and so on.

'alum ('æləm) – a substance composed of aluminium sulphate and potassium sulphate which forms eight-sided crystals; it is very bitter; it draws the skin together and hardens it; used in making leather. ↓alums.


ALUM

a'lumina (æ'luuminə) – aluminium oxide; with silica it forms the main part of clay. In its crystal form it is the main substance of many precious stones; it is combined with water in bauxite from which aluminium is obtained.

'alums – double salts of similar chemical composition to alum and forming crystals of the same shape. Ordinary alum is $K_2SO_4.Al_2(SO_4)_3.24H_2O$, i.e. potassium sulphate and aluminium sulphate with 24 molecules of water. In the alums, sodium or a similar atom (of joining power 1) takes the place of potassium; and iron (or a similar atom of joining power 3) takes the place of aluminium.

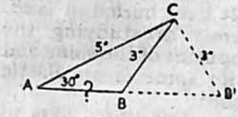
al'veolus (æl'violəs) – small hole, e.g. the hole in which a tooth grows. **al'veoli** – small air-spaces, e.g. in the lungs.

a'malgam (ə'mælgəm) – solution of a metal in mercury.

'amau'rosis ('æmɔɔ'rousis) – loss of sight caused by injury to the brain or nerve, not to the eye.

ambi-/ – on both sides, in both ways, e.g. **'ambi'dextrous** – able to use both hands equally well. **'ambient air** – the air which is on both (= all) sides, i.e. the surrounding air.

am'biguous case (æm'bigiuəs) – Ambiguous = having two meanings. If we are told to draw a triangle *ABC* in which *CAB* = 30°, the side *AC* = 5 in., the side *CB* = 3 in., we find that we can make two different triangles (*ABC* and *AB'C*). The measures given are ambiguous. This ambiguous case arises when the known angle lies between the longer side and the side whose length is not known.



AMBIGUOUS CASE

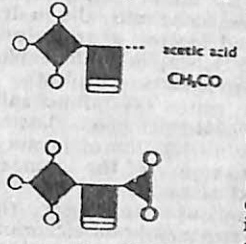
'ambit ('æmbit) - space round, e.g. round a house.

'ambly'opia ('æmbli'oupiə) – weak (dim) sight without actual fault in the eye, e.g. due to tobacco or alcohol.

'ambo'ceptor ('æmbo'septə) – ↓ complement fixation.

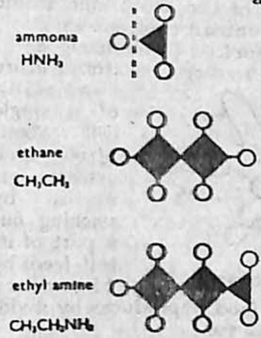
'ambul-/- ('æmbiul-) – walk. **'ambu'latory fever** (- 'leitəri) – fever so light that the person can go on walking about.

'amide ('æmaid) – compound in which one hydrogen atom of ammonia (NH_3) is replaced by the characteristic atom group of an organic acid (e.g. the group $CH_3.CO–$ of acetic acid $CH_3.CO.OH$.)



AMIDE

'amine ('æmiin) – compound in which one hydrogen atom of ammonia (NH_3) is replaced by a hydrocarbon group; e.g. ethane C_2H_6, ethyl group, C_2H_5–, ethylamine $C_2H_5.NH_2$. Aniline is phenylamine, $C_6H_5\,NH_2$.

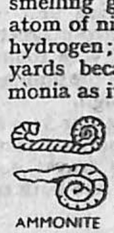


AMINE

a'mino-acids (æ'miino -) – acids which contain a –COOH group and a NH_2 group; e.g. glycine, $H_2N.CH_2.COOH$. In the process of digestion, the proteins of meat are broken down into amino-acids; these acids pass through the wall of the bowel and are built up again into proteins in the body. ↓ essential amino-acids.

'ammeter ('æmitə) instrument for measuring the strength of an electric current in ↓ amperes.

am'monia (ə'mouniə) – a strong-smelling gas – a compound of one atom of nitrogen and three atoms of hydrogen; NH_3. It is smelt in farmyards because urine gives off ammonia as it decays.



AMMONITE

'ammonites ('æmənaitz) – fossils of sea-creatures (↓ cephalopods), usually found in flat spirals.

ammonium – the

group of atoms NH_4^-. **ammonium chloride** = sal ammoniac, (NH_4Cl), used in ↓ Leclanché cells, also in dry cells for hand lamps. **ammonium nitrate** – NH_4NO_3, used in explosives. **ammonium sulphate** – $(NH_4)_2SO_4$; white crystalline substance used to add nitrogen to the soil.

am'nesia (æm'niiziə) – loss of memory, e.g. owing to injury of the brain, or to emotional causes.

'amnion ('æmniɔn) – (in an egg): the inner of the two membranes (chorion, amnion) inside the fibrous shell-membrane of an egg; in a human a membrane of the same kind inside which the unborn child grows.

ammonia clock – ↓ atomic clock.

a'moeba (ə'miibə) – water-creature consisting of a single cell, about 1/100 inch across; it moves by pushing out a part of itself, feeds by flowing round its food, reproduces by dividing itself in two.

AMOEBA

a'morphous (ə'mɔɔfəs) – which has not its atoms arranged in the regular shape of a crystal, e.g. sulphur when a powder (not crystalline), resin, rubber.

'ampere ('æmpeə) – unit for measuring the rate of flow of an electric current. An electric iron, for ironing clothes, has a rate of flow of about 2 amperes (on 230 volts); a small (40 watt) lamp, about $\frac{1}{6}$; a large (100 watt) lamp, about $\frac{1}{2}$. (One ampere = 1 ↓ coulomb per second; in ↓ electrolysis one ampere sets free 0·001118 gramme of silver per second.

ampere turn – a measuring unit of the strength of an electro-magnet; the number of turns of wire round the magnet multiplied by the number of amperes flowing through.

amphi-/ (æmfi-) – (1) around, e.g. **'amphitheatre** – theatre with seats all round; (2) in both ways; e.g. **am'phibious** – able to live both on land and in water.

Am'phibia (æm'fibiə) – class of creatures such as frogs, toads, salamanders, which live in wet places. They have moist skins, no scales or claws, and usually change from an early water-form to an adult form living partly on the land.

AMPHIBIA

'amphi'boles ('æmfi'boulz) – important group of rock-forming *silicates found in deep, heat-formed rocks and in volcanic rocks. The crystals are long and are of many different forms: *(salts formed from silica (sand)).

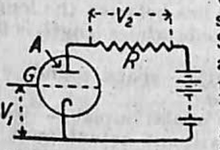
'amphi'oxus ('æmfi'ɔksəs) – ("both ends-sharp"): also called Lancelet; creature, between worm and fish in form, about 2 inches long. It lives buried in sand. It is of interest in studying the earliest development of the spine and spinal cord: its spine is an elastic rod: ↓ notochord.

AMPHIOXUS

'ampho'teric ('æmfo'terik) – able to combine with an acid *or* to behave like an acid and combine with a ↓ base (e.g. with a metal oxide).

'ampli-/ – wide.

'amplifi'cation factor – (of radio valve) – First see triode. Suppose that an increased pressure of 1 volt on the grid *G* causes an increase of $\frac{3}{100}$ amperes current through the valve. Suppose that we have to increase pressure on the anode *A* (⊕, positive plate) of the same valve by 20 volts in order to increase the through-current by $\frac{3}{100}$ amperes. The amplification factor is 20. The A.F. is the increased anode pressure necessary to produce

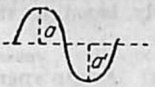


AMPLIFICATION FACTOR

the same increase of current as produced by a change of +1 volt on the grid. **Voltage amplification factor** – In a radio valve used as an amplifier (to strengthen currents) there is an alternating voltage V_1 in the grid. This causes an alternating voltage V_2 across the resistance R. The voltage amplification factor is the number of times V_2 is greater than V_1.

'amplifier ('æmpli'faiə) – radio valve used to increase the ↓ amplitude of an alternating current, and so strengthen (e.g.) the sound.

'amplitude ('æmplitjud) – the distance between the middle and the top (or bottom) of a wave, *a* or a^1 in the diagram.



AMPLITUDE

'ampoule ('æmpuul) – a small closed glass vessel containing a measured amount of a medicine ready for use.

'ampu'tation ('æmpju'teiʃən) – cutting off, e.g., a leg or arm, by a surgeon.

AMPOULE

a'mygd-/ (ə'migd-) – almond, e.g. **amygdaloid** – shaped like an almond nut.

'amyl ('æmil) – the hydrocarbon group $CH_3.CH_2.CH_2.CH_2.CH_2$–. **amyl-/** – starch. **amy'lacious** – starchy. **'amy'lases** – *enzymes which break up starch, e.g. ptyalin in the mouth: *(substances which cause chemical changes without themselves being changed).

amyl 'acetate ('æsiteit) – a substance with a fruity smell, used for fruit flavours and for dissolving ↓ nitrocellulose; $C_5H_{11}O.CO.CH_3$.

amyl alcohol – In the ↓ alcohol in wine (ethyl alcohol) there is a chain of two carbon atoms. Amyl alcohols have chains of five carbon atoms.

amylases – ↓ amyl.

amyl 'nitrite (- 'naitrait) – substance used in heart disease to make the blood-pressure lower and dilate (open wider) the arteries of the heart.

an-/ (æn-) – not, e.g. ↓ **anaerobic.**

'ana-/ ('ænə-) – (1) up, e.g. **'ana'batic winds** – winds caused by upward movement of warm air; **a'nabolism** (æ'næbəlizm) – building up materials into the body from food taken in; (2) up again, e.g. **'anabi'osis** (- bai'ousis) – coming back to life after seeming to be dead.

a'naemia (ə'niimiə) – lack of red cells or of ↓ haemoglobin (red substance) in the blood.

'anae'robic ('æne'roubik) – living without air, e.g. anaerobic bacteria. (*an* = not; *aer* = air; *bi* = live.)

'anaes'thesia ('æniis'θiiziə-) – ("not feeling"): general loss of consciousness or loss of the feeling of pain in part of the body, e.g. during surgical operation. General anaesthesia is produced by such **'anaes'thetics** ('æniis'θetiks) as chloroform or ether breathed in: local anaesthesia (in one part) is produced by injecting preparations of (e.g.) cocaine: ↓ spinal.

'anaglyph ('ænəglif) – ornament standing out from stone or plaster.

'anal ('einəl) – having to do with the ↓ anus.

'anal'gesia ('ænæl'dʒiisiə) – (*alg-/* = pain); state of not feeling pain. **analgesic** – drug which lessens or prevents pain, e.g. morphia.

'analogue ('ænəl'oug) – a mathematical instrument which does not work direct with numbers, but changes them into physical quantities, e.g. length (as in a slide-rule) or into electric currents. ↓ computer.

a'nalogous (ə'næləgəs) – looking the same or doing the same thing, but not really the same; e.g. in explaining ampere, the **a'nalogy** of a flow of water may be used, but electricity is not a liquid: water is the **'analogue** (the analogous thing).

a'nalysis (ə'nælisis) – (chemical): breaking-up of a substance into the simpler substances (e.g. elements) of which it is made; **quantitative analysis** shows the amount of each element; **qualitative analysis** shows only the nature of the substances but not the amount or proportion.

'anaphor'esis – ↓ /-phoresis.

'anaphy'lactic shock ('ænəfilæktik) – (*-phylact-* = protect). If a foreign protein (e.g. horse *serum) is injected into the body, the body becomes sensitive to it, and another injection produces fall of blood-pressure, weakness, swelling of the face and throat and serious illness. *(the clear liquid of blood).

'anastig'matic lens ('ænæstig'mætik) – Astigmatic lenses are unable to give a clear image of the cross lines and the up-and-down lines at the same time. An anastigmatic lens consists of three or more lenses of different kinds of glass joined together and has not this fault.

an'asto'mosis (ə'næstə'mousis) – making one tube or pipe (e.g. part of bowel) lead into another by surgery.

a'natomy (ə'nætəmi) – (*tom-* = *cut*, *ana* = *up*): study of the parts of the body – bones, muscles, nerves, etc.

'anchylo-/ ('ænkilou) – crooked, not straight, e.g. **'anchylosed joint** – joint of a limb in which the bones have grown together so that the joint is very stiff or has no movement.

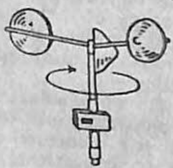
anchylostomiasis – ↓ankylostomiasis.

andro-/ – male, e.g. **an'droecium** (æn'driisiəm) – the male organ (stamens) of a flower.

'andro'gynous plant ('ændro'gainəs) – having both male and female organs: (*gyn-* = *female*).

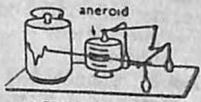
-ane (-ein) – ↓paraffin hydrocarbon (as in petroleum oil), e.g. **'heptane** (heptein) – such oil whose molecule contains seven carbon atoms. **'octane** – aero-spirit or motor-spirit with eight carbon atoms.

'ane'mometer ('æni'mɔmitə) – instrument for measuring the speed or power of wind, e.g. by turning cups.



ANEMOMETER

'aneroid ba'rometer ('ænərɔid bə'rɔmitə) – barometer worked by a vacuum box with springy walls. As atmospheric pressure increases, the box is pressed in; as atmospheric pressure becomes less, the walls spring out. Levers enlarge this movement and show it on a clock-face, or (in an **aneroid 'barograph**) draw it on a drum.



ANEROID BAROGRAPH

'aneurine ('æniuərin) – ↓vitamin B_1; lack of aneurine causes the disease beriberi.

'aneurism ('æniuərizm) – swelling out of part of the side of an artery (e.g. the ↓aorta) owing to a weakness in the wall of the vessel.

an'gina (æn'dʒainə) – difficulty in breathing as if one were being seized by the throat. **angina pectoris** (- 'pektəris) – great pain in the chest caused by narrowing of the blood vessels which supply blood to the heart.

'angio-/ ('ændʒio-) – container, vessel, blood-vessel, e.g. (1) **'Angio'spermae** – plants whose seeds ripen inside a container (seed-case), as do those of most flowering plants, but not those of the pine and fir-tree family: ↓gymnospermae; (2) having to do with a blood-vessel (or ↓lymph vessel), e.g. **'angi'oma** – a tumour (growth) composed of blood-vessels.

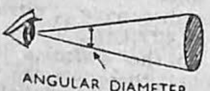
angle iron – (1) L-shaped iron beam; (2) L-shaped iron to strengthen a corner.

angle of incidence – ↓incidence.

angle of repose – slope of a bank such that earth will not slip down it in bad weather.

'Angström unit ('eŋstrom -) – unit of length (one hundred millionth of a centimetre); used as a measure of the wavelength of light. (Swedish, 1814–74.)

'angular di'ameter – The size which a round thing seems to be, depends on (1) its actual diameter and (2) its distance from the eye. The angular diameter is a measure of the seeming size. It is stated by giving the size of the angle which the thing makes at the eye (see diagram). Think of a circle whose diameter is one inch: the angular diameter of this circle held one foot away from the eye is nearly 5 degrees; the

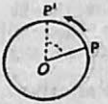


ANGULAR DIAMETER

angular diameter of the moon is about ½ degree.

'angular mo'mentum – the "force" (↓ momentum) of a thing which is turning. Two Bodies have equal angular momentum if they are brought to rest in the same time by equal ↓ couples.

angular ve'locity – The figure shows a wheel which is turning about its centre, *O*. In one second a point, *P*, on its edge moves to *P'*, so that a spoke *OP* moves through an angle *POP'*. The angular velocity (speed) of the wheel is the angle turned through per second. It is usually measured in ↓ radians per second.



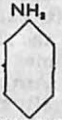
ANGULAR VELOCITY

an'hydride (æn'haidraid) – ("not containing water"): substance which, combined with water, forms an acid, e.g. the acid anhydride (acid without water, H_2O) of sulphuric acid H_2SO_4 is sulphur trioxide SO_3.

an'hydrite (æn'haidrait) – ↓ anhydrous calcium sulphate ($CaSO_4$), which with clay and water is made into plaster (e.g. plaster of Paris). Also used with ammonium salts to make a fertilizer.

an'hydrous (æn'haidrəs) – without water, e.g. anhydrous copper sulphate is a white powder; crystalline copper sulphate contains water and is blue.

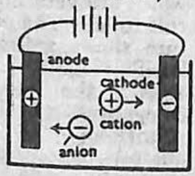
'aniline ('æniliin) – colourless oily liquid made from benzene (from coal-tar), used to make many dyes, (etc.). It was originally obtained from indigo (a blue dye). ↓ amine.



ANILINE

ani'malcule (æni'mælkjul) – very small living creature, only seen through a microscope; plural, **ani'malculae.**

'anion ('ænai.ən) – An ion is an atom or molecule with a ⊕ or ⊖ electric charge. An anion is an ion with a negative ⊖ electric charge, which therefore travels to the ⊕ anode. See picture; the container is filled with copper sulphate solution. When the electric current is turned on, anions of SO_4 go to the anode ⊕ (positive plate). **Cations** of copper go to the cathode, ⊖ (negative plate).



ANION

an'iso'tropic (æn'aiso'tropik) – having different properties (qualities) in different directions, e.g. an anisotropic crystal may have greater resistance to the flow of electricity in one direction than in a direction at right-angles.

'ankylosed ('æŋkilouzd) – ↓ anch-.

'ankylostom'iasis ('æŋkilostə'maiəsis) – hookworm, a disease caused by a small organism called the **'Ankylo'stoma 'duode'nale** ('djuodə'neili), also called Tunnel Worm. It goes in through the skin (usually of the feet), or enters in dirty drinking-water. It reproduces in the bowel; hence the name: duodenum = first 12 inches of the small intestine (bowel). It causes loss of energy and general ill-health: (*ankylo-* = crooked, not straight; *stoma* = mouth).

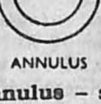
ANKYLOSTOMA

an'neal (ə'niil) – When glass or metal is shaped (into plates, bars, vessels, etc.) stresses (irregular pulling and pressing forces in the material) are caused. Annealing sets this right: the glass (metal, etc.) is heated, then cooled slowly, thus easing the forces.

An'nelida (ə'nelidə) – creatures whose bodies are made up of rings, e.g. earthworms.

'annual ('æniuəl) – yearly, e.g. **an annual** – a plant which grows, produces seeds and dies in one year; **annual ring** – a circular mark inside the trunk of a tree made by winter stopping and spring increasing the growth.

annul-/ – ring, e.g. **'annular eclipse**('ænjule) – an eclipse in which the moon does not quite cover the sun, but a ring of light is seen round the moon.


ANNULUS

annulus – small ring, space between two circles which have the same centre.

'anode ('ænoud) – the positive ⊕ plate in electrolysis: the positive ⊕ plate in a radio valve or similar instrument. ↓ anion.

anode load – resistance (or other similar electrical part) put into the anode circuit of a radio valve: (see diagram for amplification factor; *R* is the anode load).

'anodise ('ænodaiz) – to cover aluminium with a layer of aluminium oxide by electrolysis. The liquid used is chromic or sulphuric acid; the electric current sets free oxygen from the liquid and so forms a layer of aluminium oxide on the metal. This layer protects the metal and the layer can be dyed in various colours.

'anodyne ('ænodain) – drug which lessens pain, e.g. opium.

a'nopheles (ə'nɔfəliiz) – kind of mosquito which causes malarial fever. When settled, it stands off the wall with its body held outwards.

a'northic system of crystals (æ'nɔɔθik) – crystals which cannot be turned about any line so that (in less than one turn) corners, edges and faces come back into the same positions; e.g. copper sulphate. Also called Triclinic system.

a'noxia (æ'nɔksiə) – lack of oxygen in the blood or tissues. **'anox'aemia** – lack of oxygen in the blood.

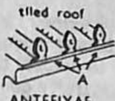
'ano'rexia (æno' reksiə) – loss of feeling of need for food, not wanting to eat.

anser (ænsə) – duck, e.g. **'Anseri'formes** – birds of the duck, swan, etc. family.

'ant'acid (ænt'æsid) – substance, such as sodium bicarbonate, used to lessen acidity (too acid state) of the stomach.

'ante-/ – (1) before, e.g. ↓ **antenatal**; (2) in front of, e.g. ↓ **anterior.**

'ante'fixae ('ænti'fiksii) – upright ornamental stones fixed along the edge of a roof, as shown.



ANTEFIXAE

'ante'natal clinic ('ænti'neitəl) – (*ante* = before: *nat-* = birth): place for medical examination and treatment used by mothers before the birth of the child.

an'tenna (æn'tenə) – the hair-like feeler of an insect; a radio aerial (receiving wire); plural **an'tennae.**

an'terior (æn'tiiriə) – nearer the front.

anterior 'pollomye'litis (- 'poulio-mai.e'laitis) – /-*itis* = inflammation of; *polio-* = grey; *myel-/* = spinal cord: inflammation of the front of the grey nerve-substance in the spinal cord; an infectious disease often causing loss of muscular power in the limbs or other parts; also called infantile paralysis; caused by a ↓ virus.

'anthel'mintic ('ænθel'mintik) – medicine taken to drive out worms from the bowel.

'anther ('ænθə) – the part of a flower which produces pollen. **'anthe'ridium** ('ænθə'ridiəm) – male organ of lower plants such as mosses and ferns.

'antho-/ ('ænθo-) – flower, e.g. **'antho'cyanins** (-'saiəninz) – chemical substances which produce the colours of flowers. **nyct'anthous** – having flowers which only open at night.

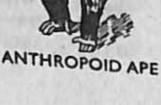
anthrac-/ – coal, e.g. **'anthracene** ('ænθrəsiin) – substance obtained from coal-tar from which alizarin dyes (e.g. madder, a red dye) are made.

'anthracite ('ænθrəsait) – hard, slow-burning coal which leaves very little ash.

'anthrax ('ænθræks) – Wool-sorter's disease, a disease caught fron handling the hair of animals. It causes black spots on the skin, hence the name (*anthrax* = coal). Anthrax of the lungs usually ends in death. The anthrax bacillus is very large, nearly as long as the width of a red blood-cell, and forms spores which are very difficult to kill. The picture shows anthrax bacilli magnified × 1,000; the round things are blood cells.

ANTHRAX

anthrop-/ ('æ-nθrəp-) – man. **'anthropoid ape** – man-like ape. **'an-**


ANTHROPOID APE

thropology – the study of man, his place in nature, his customs and way of living.

'anthro'pometry – the scientific measurement of man – height, weight, head-measure, etc.

anti-/-('ænti-) – against, e.g. ↓antibody.

'antibi'otic ('æntibai'ɔtik) – chemical substance produced by bacteria, fungi and similar organisms which prevents the growth of other organisms near them; e.g. ↓penicillin (produced by the fungus penicillium).

'antibody – substance formed in the blood to destroy bacteria (or virus), or to make the poison produced by bacteria harmless. ↓complement-fixation.

'anti'cathode – plate in X-ray tubes on which the *cathode rays strike and cause X-rays to come out: *(negatively charged particles from the negative plate): ↓X-ray.

anti'cline ('ænti'klain) – arch-like fold in a layer of rocks.

'anti'cyclone ('ænti'saikloun) – an area of high barometer-pressure (pressure of the atmosphere) higher towards the centre. Light winds flow out and the wind movement (north of the equator) is clockwise (south of equator, anticlockwise). Anticyclones usually bring fine weather.

arrows show direction of wind
ANTICYCLONE

'antidote ('æntidont) – substance given to act against a poison, e.g. an alkali (such as lime or sodium bicarbonate) in cases of an acid poison.

'anti'febrin ('ænti'febrin) – acetanilide (made from acetic acid and aniline), a medicine for fever.

'anti'fouling ('ænti'fauliŋ) – paint used to prevent growth of plants on the bottom of a ship.

'antigen ('æntidʒen) – substance (e.g. poison of bacteria) which causes an antibody to be produced in the blood: ↓complement-fixation.

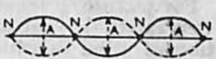
anti-logarithm – ↓logarithm.

anti-matter – matter (known only in the form of particles) which resembles ordinary matter but is such that when anti-matter and ordinary matter come together they destroy each other. **anti-proton** – like a proton but with a negative charge; **anti-electron** – a positively charged electron (also called a positron).

'anti'mer ('ænti'məə) – crystal of the same shape as another, but oppositely arranged (a mirror-image).

'antimony ('æntiməni) – a blue-white metal element; used to harden lead, e.g. to make a printer's type. In medicine it is used to cure ↓Bilharzia and ↓Kala-azar.

'anti'nodes ('ænti'noudz) – The diagram shows a stretched string (e.g. of a violin) vibrating between the positions shown. At the antinodes *A* there is most movement; at the nodes *N* there is no movement. So also when waves of light, sound, etc. are reflected, the original wave and the reflected wave combine to give points of most effect (antinode) and least effect (node).



ANTINODES

an'tipodes (æn'tipədiiz) – opposite points on the Earth, e.g. Australia from England.

'antipy'retic ('æntipai'retik) – medicine to lessen fever.

'antiscor'butic (-skɔɔ'biutik) – substance, e.g. in lemons, which prevents scurvy (a disease, e.g. of seamen, caused by eating no fresh food). ↓vitamin.

'anti'septic (-'septik) – substance used to prevent the development of bacteria in wounds, etc., e.g. iodine, carbolic acid, Acriflavine, etc.

'antispas'modics ('æntispæs'mɔdiks) – drugs which cause a loosening of the muscles.

'anti'toxin (- tɔksin) – substance produced by the body which combines with the poison produced by bacteria and makes it harmless.

anti-vitamin – ↓ toxamin.

'antrum ('æntrəm) – ("cave"): a hollow place inside a bone, e.g. above the teeth, inside the forehead just above the eyes, and in the bone behind the ear.

ANTRUM

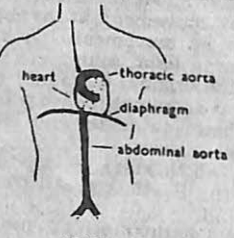
'anus ('einəs) – the outlet by which waste matter from the bowels passes out of the body.

'anvil ('ænvil) – (1) mass of iron on which hot iron is put when being beaten into shape; (2) one of the small bones of the ear, also called the ↓ incus (Latin). For picture ↓ incus.

ANVIL

an'xiety state (æŋ'zaiəti -) – an unhealthy condition of mind in which there is continual fear.

a'orta (ei'ɔɔtə) – the main blood-vessel through which blood goes from the heart into the body.



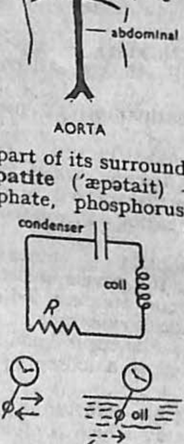
AORTA

'apa'tetic coloration ('æpə'tetik-) – colouring of an animal like some part of its surroundings.

'apatite ('æpətait) – calcium phosphate, phosphorus ore; white or coloured crystals common in igneous (heat-formed) rocks.

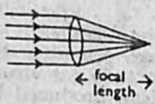
a'perient (ə'piiəriənt) – drug used to cause action of the bowels.

'aperi'odic ('eipiəri'ɔdik) – (e.g. pointer of an instrument): coming to rest (stopping) at once without first moving to and fro over the mark. **aperiodic circuit.** See the diagram. If the resistance R is small, an electric current can swing backwards and forwards: ↓ (acceptor circuit). If the resistance is large; there will be no swing. (It is like a pendulum in a thick liquid.) This circuit (in which there is no swing) is an aperiodic circuit.



APERIODIC

'aperture ('æpətiuə) – (of lens) – size of the circle through which light is allowed to pass: a camera with a lens aperture *f*/6 is one in which the diameter of the lens is $\frac{1}{6}$ of the focal length (see diagram).



APERTURE

'apex ('eipeks) – top, highest point: plural, **apices** ('eipisiiz).

a'phasia (ə'feisiə) – disorder (or loss of the power) of speech due, e.g., to damage to the brain.

a'phelion (æ'fiiliɔn) – the point on the orbit of a planet furthest from the sun.

'aphis (aphides) ('eifis-, -i'diiz) – very small black, grey or green insect(s) seen on plants, e.g. the black insects seen on beans.

APHIS

a'phonia (æ'founiə) – loss of voice (but not loss of speaking power), e.g. in a bad cold or due to damage to the voice-producing organs.

'aphtha(e) ('æfθə, -ii) – small grey spot(s) inside the mouth due to the excretion (passing out from the body) of some poisonous or irritating substance through the mucous membrane which covers the inside of the mouth.

api-/ (eipi-) – bee, e.g. **'apiculture** – bee-keeping.

'apical ('eipikəl) – of the apex, at the top.

'apla'natic lens ('eiplə'nætik) – lens which gives a picture in which the lines are not bent out of their true shape by an imperfect curve of the lens. ↓ spherical aberration.

ap'noea (æp'niiə) – ceasing to breathe, e.g. because there is too little carbon dioxide in the blood to stimulate breathing. ↓ hyperventilation.

'apo-/ ('æpo-) – away, e.g. **'apogee** ('æpodʒii) – furthest point from the Earth (or other planet) of a satellite (e.g. the moon) going round it.

apo'morphine (æpo'mɔɔfiin) – drug used to produce vomiting, or, in smaller amounts, to ease a cough.

ap'parent magnitude (ə'pærənt) – comparative brightness of a star as seen from the Earth. ↓ absolute magnitude.

apparent movement (of a star, of the sun, etc.) – seeming, but not true movement; the person looking at the star (etc.) is himself moving because the Earth is moving.

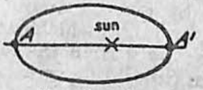
ap'pendix (ə'pendiks) – **'vermiform appendix** ('vəə-mifɔɔm -) – small tube with a closed end growing out of the bowel on the right-hand side. **ap'pendi'citis** (ə'pendi'saitis) – inflammation of the appendix. **ap'pendi'cectomy, 'appen'dectomy** – the surgical operation of cutting out the appendix.

APPENDIX

'apper'ception ('æpə'sepʃən) – bringing a new idea into relation with ideas already in the mind.

'Appleton layer ('æpltən -) – part of the atmosphere about 150 miles above the Earth, which reflects short radio waves: ↓ F-layer.

'apron ('eiprən) – protective cloth worn round the waist; anything stretching out in front, e.g. cement floor in front of hangar (aeroplane-house). **apron** ↓ **flashing** – strip of lead standing out from a chimney so that water may not run down between the chimney and the roof.



line of apsides
APSE LINE

apse line – line joining points on an orbit of a planet which are nearest to and furthest from the centre round which the planet is moving. Each point is an **'apsis** ('æpsis); pl. **'apsides** 'æpsidiiz).

apter-/ – (*pter-* = wing); having no wings, e.g. **'Aptera** ('æptərə), **Apte'rygota** (æptə'raigɔtə) – class of insects which do not have wings, e.g. Silver Fish insects.

APTERYGOTE

aq-/-, aqua ('ækwə) – water.

'aqua 'fortis (- 'fɔɔtis) – nitric acid.

'aquama'rine (-mə'riin) – a pale blue jewel.

'aqua'regia (- 'riidʒiə) – one part nitric acid with four parts hydrochloric acid. It dissolves gold.

'aqueous humour (ækwiəs hi'uumə) – the watery liquid in front of the lens of the eye.

ara-/ (ærə-) – plough, e.g. **'arable land** – ploughland (not grass).

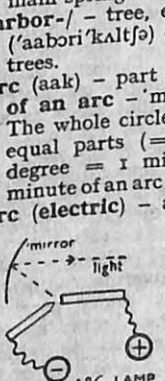
A'rachnida (æ'ræknidə) – the family to which spiders belong. **a'rachnoid** – like a spider, like a spider's web (net), e.g. **arachnoid membrane** – a very thin covering (middle of the three coverings) over the brain; it also covers the spinal cord.

'arbor ('aabə) – bar with nut and screw on the end. A polishing wheel (or other tool) is screwed on, and the bar is put into a lathe or motor which turns it round; (in a watch or clock) – axle, e.g. **arbor barrel, barrel arbor** – centre-bar round which the main spring of a watch is coiled.

'arbor-/ – tree, e.g. **'arbori'culture** ('aabɔri'kʌltʃə) – the art of growing trees.

arc (aak) – part of a circle; **second of an arc** – measure of an angle. The whole circle is divided into 360 equal parts (= degrees): $\frac{1}{60}$ of a degree = 1 minute of an arc: $\frac{1}{60}$ minute of an arc = 1 second of an arc.

arc (electric) – a flow of electricity through air (or gas) so making a very hot flame and light. **arc-welding** – melting metals together by means of an electric arc.



ARC LAMP

archae-/ (aakii-) –

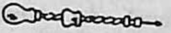
old, e.g. **ar'chaean rocks** – very old rocks, about (?) 1,800 million years old. **'archae'ology** – the study of the history of man by means of the remains (buildings, carvings, pots, etc.) which he has left. **'archae'opteryx** ('aaki'ɔpteriks) – earliest type of bird as shown by fossils.

ARCHAEOPTERYX

'arche-/ – beginning, first. **'archetype** ('aakitaip) – first type or model, e.g. first aeroplane of a new kind from which others are copied. **/-arche** – beginning of, e.g. **'menarche** – the beginning of ↓ menstruation.

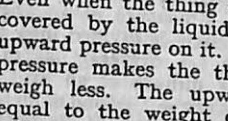
'arche'gonium ('aaki'gouniəm) – female organ of mosses and ferns.

'archi'medean drill ('aaki'miidiən) – The cutting point (for making a hole) is fixed in the end of a spiral screw which is made to turn first one way then the other by moving a close fitting hollow knob up and down.


ARCHIMEDEAN DRILL

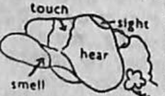
'archi'medean screw – sloping pipe with a spiral screw in it. When the screw is turned round and round water is raised by it; it is now used for raising grain.

'Archi'medes – Principle of ('aaki'miidiiz-) – When a thing is put into a liquid, e.g. a ship in the sea, the liquid presses upwards on it. Even when the thing is completely covered by the liquid there is an upward pressure on it. This upward pressure makes the thing seem to weigh less. The upward force is equal to the weight of the liquid which the thing displaces (pushes aside) – (Greek, ? 287–212 B.C.).



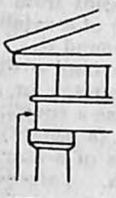
A = weight of B
ARCHIMEDES

'archi'pallium ('aaki'pæliəm) – ("old covering, coating") the older part of the brain as in animals, in which the areas of smell and taste are large; in the **neopallium** ("new -"), as in man, the larger areas are those of sight and touch.



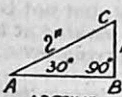
ARCHIPALLIUM

'architrave ('aakitreiv) – the lowest part of the stone-work lying across the top of two (or more) pillars; the ornamental edge round a door or window.


ARCHITRAVE

'archi'volt ('aaki'volt) carvings on the face of an arch.

'arcsine ('aaksain) – The value of length BC ÷ length AC is the sine of the angle CAB, e.g. $\sin 30^\circ = \frac{1}{2}$. This statement can be written backwards: 30° is the angle whose sine is $\frac{1}{2}$. The backwards statement is usually written $30^\circ = \text{arcsine } \frac{1}{2}$ or $30^\circ = \sin^{-1}\frac{1}{2}$. Thus arcsine x = the angle whose sine is x.



ARCSINE

a'rena (ə'riinə) – sand. **'are'naceous** ('æri'neiʃiəs) **plants** – plants which grow in sandy places.

'are'ola ('æri'oulə) – small coloured or sunk ring, e.g. round the nipple of the breast.

'argent-/ ('aadʒənt-) – silver, e.g. **'argentite** – rock from which silver is obtained.

'argill-/ ('aadʒil-) – clay, e.g. **'argil'laceous** rocks.

'argol ('aagɔl) – impure cream of tartar (tartrate of potash), red material formed at bottom of the container when making wine.

'argon ('aagɔn) – an *inert gas, 1% of the atmosphere: *(which does not combine with other elements): it is used to fill electric lamps.

'arith'metic mean ('æriθ'metik 'miin) – the ordinary average, e.g. the arithmetic mean of 3, 11, 1 = 5.

'arith'metic pro'gression (- prə'greʃən) – a series of numbers such that each is greater than (or less than) the one before by a fixed amount, e.g. 3, 7, 11, 15, 19 . . . in which each number is bigger by 4 than the one before. The sum (total) of a series of numbers in arithmetic progression is found by this rule: sum = $\frac{1}{2}$ × (first number + last number) × number of terms (numbers).

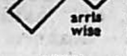
/-arium (-eəriəm) – place in which things (e.g. plants or animals) are kept) e.g. **a'quarium** (ə'kweəriəm) glass container with living fishes and water-plants. **herbarium** (həə'beəriəm) – collection of plants.

'armature ('aamətʃə) – (1) a piece of soft iron on the end of a magnet to keep the magnet strong; (2) iron bar in an instrument (e.g. electric bell) moved by a magnet; (3) that part of an electric generator in which the current flows; (4) the part of an electric motor in which the movement is produced.

'aro'matic ('ærə'mætik) – having a sweet smell. **aromatic compounds** – compounds whose molecules contain carbon atoms (and sometimes other atoms) arranged in a ring or rings; ↓benzene is the simplest aromatic compound; many scented compounds are of this kind.

ar'rangements = ↓permutations.

'arris ('æris) – edge; bricks set **arris-wise** (see picture).



ARRIS

'arsenic ('aasnik) – a grey metal element; poisonous; used to make glass clear, to make green colours, to preserve wood, kill rats (etc.), wash sheep; arsenic compounds are used in medicine, e.g. for the skin: see also salvarsan.

'artefact ('aatifækt) – (1) a stone shaped, not by natural forces, but by man as a tool (also written **artifact**); (2) something seen in a tissue under the microscope which is not natural but an effect of the way in which the tissue has been prepared for the microscope.

ARTEFACT

ar'terioles (aa'tiərioulz) – small blood-vessels leading blood from the arteries (blood-vessels *from* the heart) to the capillaries (very small blood-vessels) after which blood passes back through the veins to the heart.

ar'terio-scle'rosis (- skle'rousis) – thickening of the walls of the arteries due to old age or to disease.

ar'tesian well (aa'tiisiən -) – pipe pushed down into the ground till it comes to water; the water comes part of the way (or all the way) up the pipe by its own pressure.

arthr-/ – joint; **ar'thritis** (aa'θraitis) – swelling and pain in the joints.

'Arthro'poda ('aaθro'poudə) – creatures such as insects, crabs, spiders, scorpions. Their bodies have a jointed hard covering and they have jointed legs.

ar'ticulate (aa'tikjuleit) – join together, e.g. sounds in speaking ("articulate one's words clearly"); join bones together. **articulated skeleton** – all the bones of a body joined up in their proper places, e.g. for teaching.

'arti'ficial ho'rizon (aati'fiʃəl hə'raizən) – When the real horizon cannot be seen, a cup of mercury (= artificial horizon) is used to give a level base in finding the angle of the sun or a star. In an aeroplane the artificial horizon is a bar held level by a ↓gyroscope; the shape of the plane itself is shown in front of the bar.

'aryl ('æril) – A radical (root) is a group of atoms which remains the same in different compounds. The aryl radicals are the radicals of the ↓aromatic compounds, e.g. phenyl-radical C_6H_5–.

As – chemical sign for ↓arsenic.

'asa'foetida ('æsə'fiitidə) – resin got from a plant of the Fennel family: it has a very bad smell; it is used in medicine for nervous (emotional) disorder.

as'bestos (æz'bestɔs) – mineral fibre used for fire-proof (fire-resisting) materials.

'ascaris ('æskəris) – group of worms which live in the bowel, e.g. round-worms.

ASCARIS

asci-/, asco-/, – a bag. **ascus** – a long or ball-like bag in certain fungi (the **'Ascomy'cetes** ('æskomai'siitiiz)) in which spores – usually eight in number – are formed.

as'cites (ə'saitiiz-) – condition in which there is clear liquid in the cavity of the peritoneum (part of the body which is folded round the digestive organs).

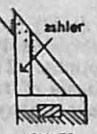
as'corbic acid (əs'kɔːbik -) – chemical substance (= ↓ vitamin C) found in fresh fruit; it prevents scurvy (disease, e.g. of seamen in old times).

'Asdic ('æzdik) – instrument used to find submarines by sending out sound waves through the water and measuring the time of the echo: named after the Allied Submarine-Detection Investigation Committee.

/-ase (eis) – An enzyme is a protein which is able to cause chemical change without itself being changed; example, the enzymes of yeast. /-ase indicates an enzyme; e.g. **'amyl'ase** — an enzyme which breaks down starch; there is an amylase in the liquid of the mouth (saliva); **'protease** – an enzyme which breaks down proteins; **'oxidase** – an enzyme which brings about ↓ oxidation.

'ashlars ('æʃləz) – carefully finished well-fitted building-stones.

'ashlering ('æʃləriŋ) – upright boards used to shut in the angle made by a roof meeting a floor.



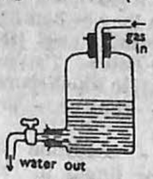
ASHLER

'aspect 'ratio (of an aeroplane) – the distance from the end of one wing to end of other wing divided by the width of the wings.

'asphalt ('æsfælt) – solid black matter obtained from places where petroleum is found, also from petroleum oil in the process of making motor-spirit, paraffin, paraffin wax, etc. Used in making roads, building-boards, waterproof paper, materials for roofs.

as'phyxia (əs'fiksiə) – state due to lack of oxygen in the blood owing to not being able to breathe.

'aspi'ration ('æspi'reiʃən) – drawing out liquid or gas from the body. **'aspirator** – instrument for drawing up liquid or gas; e.g. a bottle with a tap at the bottom; as water flows out of the bottom, gas is drawn in.



ASPIRATOR

'aspirin ('æspərin) – name for acetylsalicylic acid, used to lessen headaches, pain and fever.

as'say (ə'sei) – find how much gold or silver there is in an alloy or rock. In a dry assay, the substance to be assayed is mixed with lead oxide, a substance such as charcoal (which will combine with the oxygen of the lead oxide), and a flux (substance which will carry away the impurities). When this mixture is heated, melted lead flows down to the bottom carrying the silver or gold with it.

as'simi'lation (ə'simi'leiʃən) – the whole process of taking in food and building it up into the body.

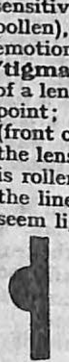
as'soci'ation (ə'souʃi'eiʃən) – joining together of ideas in the mind, e.g. "This smell always makes me think of . . . (place) . . .": (chemistry) the loose joining together of molecules in e.g. a pure liquid or vapour.

aster-/, astro-/ (æstə-, æstro-) – star, of or by or like a star, e.g. **'astronavi'gation** – steering a ship or aeroplane by the stars. **'asteroids** ('æstərɔidz) – small planets whose orbits round the sun pass between Mars and Jupiter.

asthen-/ – not strong, e.g. **'asthe-'nopia** ('æsθe'noupiə) – weakness of the eyes, or the eye-muscles.

'asthma ('æsmə) – difficult breathing caused by sudden contractions of the tubes (bronchi) leading into the lungs; sometimes caused by special sensitiveness to certain proteins (e.g. pollen), and partly (? mainly) to emotional causes.

as'tigmatism (əs'tigmətizm) – failure of a lens to bring rays of light to one point; e.g. in the eye the cornea (front clear membrane of the eye) or the lens is not regularly curved, but is roller-shaped; as a result some of the lines of such letters as **M, X, Z** seem lighter than others. ↓ anastigmatic lens.



ASTRAGAL

'astragal ('æstrəgəl) – a half-circular raised line standing out from stone in a building.

ast'ragalus (æs'trægələs) – the square bone between the bottom of the leg-bone and the foot.

ASTRAGALUS

'astra'khan ('æstrə'kæn) – skins of young lambs with tightly curled hair, usually dyed black.

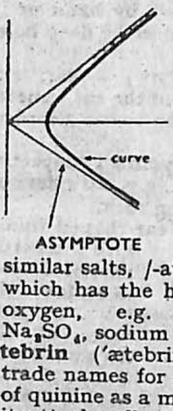
ast'ringent (əs'trindʒənt) – (substance) which causes the skin (or other tissue) to contract, e.g. alum.

'astro'nomical unit ('æstrə'nɔmikəl -) – the mean (average) distance of the Earth from the sun (92,900,000 miles) used as a measuring unit.

'astro'physics ('æstro'fiziks) – the study of the nature of stars, of their chemical elements, temperature, light-power, etc.

'asym'metric (carbon atom) – ↓ stereo-isomerism.

'asymptote ('æsimptout) – a line in a mathematical figure to which another line gets nearer and nearer but never meets it; adj. **'asymp'totic** ('æsimp'tɔtik).



ASYMPTOTE

/-ate (eit) – a chemical salt, e.g. carbonate – a salt of carbonic acid. When there are two similar salts, /-ate indicates the one which has the higher proportion of oxygen, e.g. sodium sulphate Na_2SO_4, sodium sulphite Na_2SO_3.

'atebrin ('ætebrin) = mepacrine; trade names for a drug used instead of quinine as a medicine for malaria; it attacks all stages of the malaria organism except the sporozoites (spores injected by the mosquito) and the sex-stage of ↓ malignant malaria.

ate'lectasis (æte'lektəsis) – (*atel-* = not perfect: *-ectasis* = expansion, blowing out): failure of the lungs to fill with air at birth, or collapse (falling in) of the lungs in illness.

'ather'oma ('æθə'roumə) – thickening of and swelling of the inner coat of arteries.

'athlete's foot – disease which causes roughness and irritation of the skin of the foot; caused by a fungus.

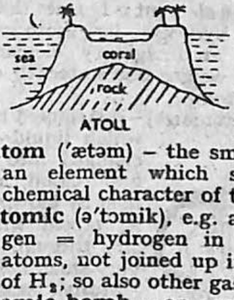
'athodyd ('æθodaid) – aero-thermodynamic duct: an instrument for flying at very great speeds, e.g. faster than sound. A jet-plane pumps in air at the front, mixes it with oil, burns it and blows out hot gases at the back. An athodyd does not use a pump: the speed of its movement drives in air at the front; oil is burned in the tube and hot gases come out at the back. It cannot start working until it is moving very fast, e.g. carried by an aeroplane.

'atlas bone ('ætləs -) – the top bone of the backbone.

at'molysis (æt'mɔlisis) – method of separating two gases of a mixture by using a membrane through which they pass (diffuse) at different speeds.

'atmos'pherics ('ætməs'feriks) – electrical forces which cause cracks and other noises in radio sets.

a'toll (ə'tɔl) – island made of coral (a stone-like substance built by small creatures up from the bottom of the sea).



ATOLL

'atom ('ætəm) – the smallest part of an element which still has the chemical character of the element.

a'tomic (ə'tɔmik), e.g. atomic hydrogen = hydrogen in the form of atoms, not joined up into molecules of H_2; so also other gases.

atomic bomb – an explosive instrument in which matter is changed into energy by breaking up the nucleus (central part) of atoms of ↓ uranium 235 or of ↓ plutonium. First used in New Mexico 1945.

atomic clock – Certain atoms (e.g. caesium) resonate (respond) to very short radio waves of an exact frequency. If a radio circuit is made to give these waves, the frequency (cycles per sec.) is accurately known. Thus caesium atoms can serve to test the accuracy of the frequency of the currents in the circuit. A clock based on this idea is the most accurate time-measuring instrument in existence. The vibration of ammonia molecules (NH_3) is generally used for this purpose.

atomic heat – the heat needed to raise the temperature of one *gram-atom by 1° C.: *(amount of an element whose mass in grams is the atomic weight).

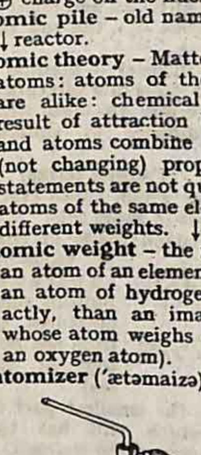
atomic number – the number of an element when arranged with other elements in order of atomic weight: it is equal to the number of electrons going round the nucleus and to the ⊕ charge on the nucleus.

atomic pile – old name for a nuclear ↓ reactor.

atomic theory – Matter is made up of atoms: atoms of the same element are alike: chemical actions are a result of attraction between atoms, and atoms combine in certain fixed (not changing) proportions. (These statements are not quite true because atoms of the same element may have different weights. ↓ isotopes.)

atomic weight – the number of times an atom of an element is heavier than an atom of hydrogen (or, more exactly, than an imaginary element whose atom weighs one-sixteenth of an oxygen atom).

'atomizer ('ætəmaizə) – instrument by which liquid is changed into a fine cloud or mist by blowing it, mixed with air, through a very small hole.



ATOMIZER

'atony ('ætɔni) – loss of power in a muscle.

a'tresia (æ'triiziə) – (of an opening of the body) not being open, not passable, e.g. **oesophageal atresia** – state in which the food-pipe is narrowed so that food cannot pass down it.

'atrophy ('ætrəfi) – wasting away of a part of the body caused by lack of blood supply: (*troph-* = food).

'atropine ('ætrəpiin) – drug obtained from Belladonna (= Deadly Nightshade) used to stop formation of sweat, of liquid in the mouth, nose and eyes, e.g. so as to keep the airways clear when giving an anaesthetic (e.g. chloroform or ether). It quickens the heart and causes wide-opening of the pupil of the eye.

at'tenu'ation (ə'tenju.'eiʃən) – weakening, e.g. of the poison of bacteria, of electric power.

at'trition (ə'triʃən) – rubbing away, e.g. of the surface of a stone.

Au – chemical sign for gold.

audi-/, audio-/ ('ɔɔdi-) – hear, e.g. **'audible** – which can be heard. **'audi'bility** – ability to be heard, e.g. the Range of Audibility is about 15,000 vibrations per second, down to 20 vibrations per second.

AUGER

'audio-'frequency – the number of electrical waves per second which give rise to (can be changed into) audible (hearable) sounds, i.e. up to about 15,000 pulses per second.

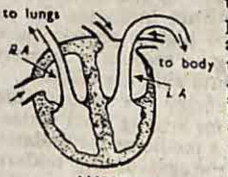
'auger ('ɔɔgə-) – spiral cutter turned by hand or in a ↓ brace to make deep holes in wood.

aur-/- (ɔɔr-) – ear, e.g. **aural**, adj. of the ear, **aurist** – doctor who treats disorders of the ear.

aureomycin – ↓ /-mycetin.

auri-/ (ɔɔri-) – gold, e.g. **au'riferous rock** – gold-bearing rock.

'auricle ('ɔɔrikəl) – ear-shaped thing; the outside part of the ear. **auricles** – the two upper parts of the heart into which the blood flows. (The ventricles, the two lower parts, act as pumps.)



AURICLES

au'ricular – of the ear, e.g. **auricular canal** – the hole leading into the ear.

Au'rora 'Bore'alis (ə'rɔɔrə 'bɔri'eilis) – arch of coloured light in the sky seen in the far north, caused by electrical particles sent out by the sun. In the south the same sort of arch is called **Aurora Aus'tralis** (- ɔs'treilis).

'auscul'tation ('ɔskʌl'teiʃən) – listening to the sounds inside the body.

'auste'nite ('ɔste'nait), **austenitic steel** – steel in which the carbon is dissolved in the iron. Ordinarily the carbon crystallizes out, but nickel, chromium or manganese prevents this. Austenitic steels are easily worked and are hardened by working, but are not elastic. Austenitic steels include a manganese steel as used for railway lines at crossings ("points"), a nickel steel which expands little with heat and is used for scientific instruments, and stainless steel (as in table-knives).

'auto-/ ('ɔɔto-) – self, e.g. **'auto'gamic** (- 'gæmik) – fertilizing itself.

'autoclave ('ɔɔtokleiv) – steel container inside which there is heat and pressure, e.g. for sterilizing (killing bacteria in) dressings to be used in surgery.

au'tochthonous (ɔɔ'tɔkθənəs) – existing from the beginning, native: (food, etc.) produced within a group of living things, not got from outside.

au'togenous – ↓/-genous.

'auto'giro, autogyro ('ɔɔto'dʒairou) – flying machine with revolving wings; the wings turn of themselves as the machine goes through the air, and the front edge of each of the blades turns up as it moves forward.

AUTOGIRO

'auto-intoxi'cation – poisoning of the body by substances produced by the body.

au'tolysis (ɔɔ'tɔlisis) – breaking up of the chemical substances of a cell after death by the ↓enzymes contained in the cell; (in life these enzymes are kept separate and controlled).

'auto'nomic ('ɔɔto'nɔmik) – self-ruling, self-regulating, e.g. **autonomic nervous system** – the nerve supply of the self-acting parts of the body, e.g. organs of breathing and digestion, and the heart. ↓sympathetic, para-sympathetic.

'auto-sug'gestion – causing ideas to be fixed in one's own mind, e.g. thinking oneself to be ill and so becoming ill.

au'toxi'dation (ɔɔ'tɔksi'deiʃən) – absorbing oxygen from the air as in the "drying" of paint.

aux-/ (ɔɔks-) – increase, **'auxa'nometer** ('ɔɔksə'nɔmitə) – instrument used for measuring the rate of increase in the length of part of a plant.

'auxins ('ɔɔksinz) – substances formed in plants, e.g. at the top of the leaf, which cause growth (or in the root, causing root formation). Auxins are also found in animal urine, and have been made in the laboratory.

a'vailable (ə'veiləbl) – e.g. **available *carbohydrate**, etc. – which can be used by the body; e.g. cellulose (wood fibre) is a carbohydrate but cannot be digested by man, and so is unavailable, but it is available to cows: *(class of chemical substances which includes sugar, starch, etc.).

'avian ('eiviən-) – of birds, e.g. avian tuberculosis.

'Avo'gadro ('ævə'gaadrou); **Avogadro's Constant (Number)**. First understand gram-molecule. The atomic weight of oxygen is 16, of hydrogen, 1; so the molecular weight of water (H_2O) is 1 + 1 + 16 = 18; a gram-molecule of water weighs 18 grams. The gram-molecule of carbon dioxide, CO_2, weighs 44 (12 + 16 + 16) grams. The number of molecules in each of these gram-molecules (and of every other gram-molecule) is (about) 61 followed by 22 noughts (0's). This number is Avogadro's constant. **Avogadro's hypothesis** – Equal volumes of different gases at the same temperature and pressure contain the same number of molecules. (Italian, 1776–1856.)

awl (ɔɔl) – pointed tool for making a hole, e.g. to start a small nail.

awn (ɔɔn) – long sharp hair on the top of a grass, e.g. barley.

'axes ('æksiiz) – pl. of ↓axis.

'axial ('æksiəl) – of the axis, e.g. **axial strain** – pulling or pushing out of shape along the line of the ↓axis, measured as a fraction of the original length.

'axicon ('æksikɔn) – kind of lens

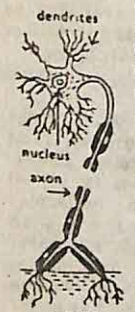
which has a great depth of focus, i.e. can focus light from objects which are within a wide range of distances (but only along its axis (middle line)).

'axil ('æksil) – the upper angle between the leaf and stem of a plant.

a'xilla (æk'silə) – the hollow under the arm, the arm-pit.

'axis ('æksis) – a straight line through a thing such that the thing might turn round equally on it – as on an axle; an imaginary line between the centres of opposite faces of a crystal: (bone) second bone (from the top) of the spine. **axis of a magnet** – a straight line through the two poles of a magnet.

'axis 'cylinder (-'silində) – = **axon** ('ækson) – the nerve fibre leading from the nerve-cell to where the nerve ends in an organ, or where it joins up with another nerve.



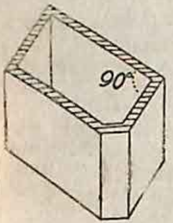
AXON of nerve cell

'Axminster carpet ('æksminstə -) – carpet whose tufts are held in place by chain-stitch. There is no buried wool on the under-surface.

'axo'lotl ('ækso'lɔtl) – water-form of a salamander, an ↓amphibian: interesting because ↓thyroid extract given in food causes development from water-(fish-like) form to amphibian form with legs.

AXOLOTL

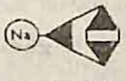
'axon – ↓axis cylinder. **axon-reflex** (-'riifleks) – a nerve-impulse which acts directly on the muscles, acting through the branching of the nerve fibres, e.g. without passing through the nerve cell; seen in contracting the blood-vessels when they are cut. ↓reflex.



AXONOMETRIC

'axono'metric drawing ('æksono'metrik) – drawing of a thing (e.g. a house) as seen if looked down on from one corner at an angle of 45° so that front and sides are seen; also called **'axiometric -**.

'azides ('æzaidz) – Hydrazoic acid (HN_3) contains three nitrogen atoms: the salts of hydrazoic acid are azides, e.g. sodium azide, NaN_3. The azides of the heavy metals, e.g. lead, are very explosive.



NaN$_3$ AZIDE

..N:N... AZO

'azimuth ('æzimʌθ) – the angle which describes in what direction from north a star lies.

'azo ('æzou) – The group –N:N– is called the **azo group**; it is a chromatophore (colour-carrying group). **Azo dyes** contain the azo group; they are yellow, red, or brown.

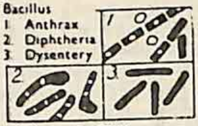
B

B – chemical sign for ↓boron.
B.A. – ↓British Association.
Ba – chemical sign for ↓barium.
B.A.L. – ↓Bal.
B.C.G. – a ↓vaccine for tuberculosis.
B.H.C. = ↓gammexane.
B.H.P. – ↓brake horse-power.
B.M. – ↓bench mark.
b.p. – ↓boiling point.
B.P. – British ↓Pharmacopoeia.
B.Th.U. – ↓British Thermal Unit.
B.T.U. – ↓Board of Trade Unit.
B.W.D. – ↓bacillary.
β – ↓beta.

'Babbitt's 'metal ('bæbitz) – a soft alloy of lead, tin, antimony, copper, used for axle-bearings.

Ba'binski 'reflex (bæ'binski) – turning the big toe up and spreading out the other toes when a finger is drawn lightly over the underside of the foot; young babies do this, but in grown persons the big toe is bent down, and the reflex is a sign of nervous disease.

Ba'cillary White Diar'rhoea, B.W.D. – a disease causing a flow of white



BACILLI

liquid from the bowel of young poultry; the disease is easily spread, and is inherited in the egg.

ba'cillus/-i (bə'sıləs) – small rod-shaped bacterium (-a).

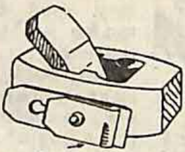
back e.m.f. – pressure of electricity in the opposite direction to the main current.

back-fire – explosion in the cylinder of a motor-car engine before the piston reaches the top of the upward stroke.

background radiation – radiation (which is always present) due to ↓ cosmic rays and to traces of radioactive substances in nearly all kinds of matter.

backing (of wind) – changing direction by turning the opposite way to a clock, e.g. backing from S.W. through S. to S.E.

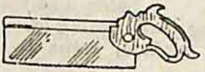
'back iron – stiffening plate screwed to the blade of a plane.



BACK IRON

'back-lash – looseness in a joint of a machine so that there is some free movement in one part before another part (which is joined to it) begins to move.

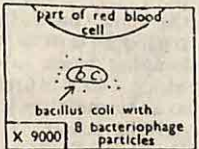
'back-saw – saw with a wide stiffening band along its back, used for making straight cuts in wood.



BACKSAW

'backwash – stream of water (or air) thrown backwards by the propeller of a ship or aeroplane.

bac'teriophage (bæk'tiəriofeidʒ) – a ↓ virus which destroys bacteria. See picture; the small dots are bacteriophages magnified 9,000 times; the large mass is a bacillus coli. The diameter of a red blood-cell is about 5 times the length of the bacillus.



BACTERIOPHAGE

bac'terio'static – preventing bacteria from multiplying but not killing them; potassium chlorate has a bacteriostatic effect.

bac'terium/(-a) (bæk'tiəriəm, -ə) – microscopic living thing(s); most are composed of only one cell, and some are able to move. They are forms of plant life nearest to the fungus. Some cause decay and disease, but many are useful, e.g. those which break down dead matter in the soil and those which fix nitrogen from the air for plant use. **bac'teri'ology** – the study of bacteria.

'baffle-board ('bæfl-bɔəd) – plate used to make air, gas, or liquid flow in a different direction.

ba'gasse (bə'gæs) – fibre left after pressing sugar-cane, sometimes used to make building-boards for inside use.

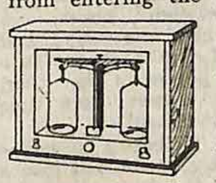
'Baily furnace ('beili -) – electric furnace with coke as a resistance used for heating iron and steel.

'Baily's 'beads – bright points seen on the edge of the moon just before an eclipse of the sun becomes total (complete).

baize (beiz) – coarse woollen cloth with a hairy surface, often green.

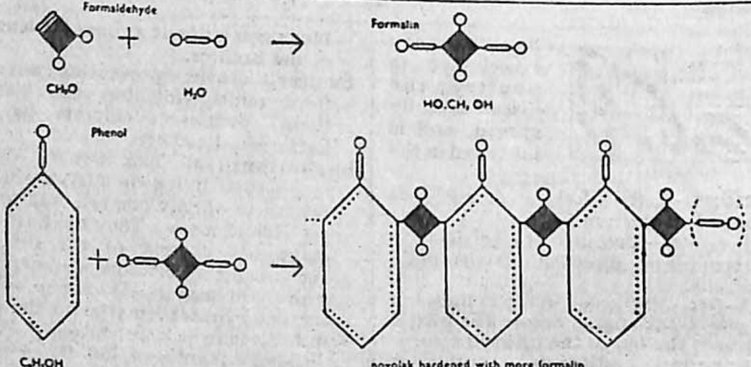
'Bakelite ('beikəlait) – a plastic material made from carbolic acid (phenol) and formaldehyde; various moulded articles are made of it: (trade name). For diagram, see next page.

Bal – cure for mercury and arsenic poisoning. Arsenic combines especially with the hair, nails and skin (which contain sulphur). The sulphur of Bal combines more strongly and so prevents arsenic (or mercury) from entering the body-substance. (The name comes from British Anti-Lewisite: Lewisite = a poison-gas used in war.)



CHEMICAL BALANCE

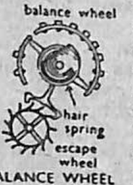
'balance, chemical balance – instrument used for very accurate weighing.



novolak hardened with more formalin into bakelite

BAKELITE

balance - staff – the axle of a ↓balance-wheel.



BALANCE WHEEL

balance-wheel of a watch – the small wheel which turns to and fro in a watch; it does the same work as the pendulum of a clock. Its swing is regular (e.g. $\frac{1}{5}$ second each way); so, by means of the ↓escapement, it allows one tooth of the escape-wheel to pass each $\frac{1}{5}$ second.

'balata ('bælətə) – material like rubber, used, e.g., to make golf balls.

ba'leen (bæ'liin) – plate through which certain whales draw sea-water to extract their food from it. ↓plankton.

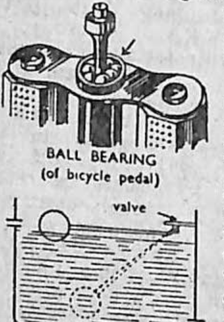
balk, baulk (bɔɔk) – wall of un-dug earth left between two places which have been dug; a log of wood cut so that it is square and has four smooth sides. ↓billet.

BALL AND SOCKET JOINT

'ball and 'socket joint – joint (e.g. between bones) in which the round end of one part fits into a hollow of the other. It allows very free movement.

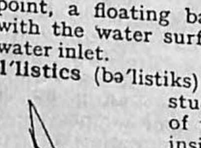
'ballast ('bæləst) – (1) substance, e.g. stone, put into a ship to make it steady in the water when not carrying a full load; (2) broken stones used to make a bed for railway lines.

ball-bearing – ring of balls round an axle so that a wheel may turn easily.



BALL BEARING (of bicycle pedal)

ball - clay – clay used to make white pottery.



BALLCOCK

ball-cock – instrument used to control the filling of a cistern (e.g. water-container in a house). As soon as the water falls below a certain point, a floating ball (going down with the water surface) turns on a water inlet.

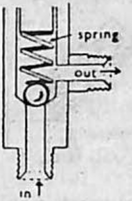
bal'listics (bə'listiks) – the scientific study of gunfire, e.g. of the gas-pressure inside the gun, the path and force of the shot. **ballistic pendulum** – a hanging block into which a shot is fired so as to measure its striking power.

BALLOON

ba'lloon (bə'luun) – bag filled with light gas (e.g. hydrogen) which goes up in the air. **balloon sail, balloon canvas** – wide extra sail set up to get extra speed, e.g. in racing.

ball-race – the ring in which the balls of a ↓ ball-bearing run.

ball-valve – ball which fits into the end of a pipe so that liquid can flow only in one direction – not backwards into the inlet pipe.



BALL VALVE

'balneo-/- ('bælnio-) – bath, bathing; e.g. **'balneo'therapy** (-'θerəpi) – treating illness by baths.

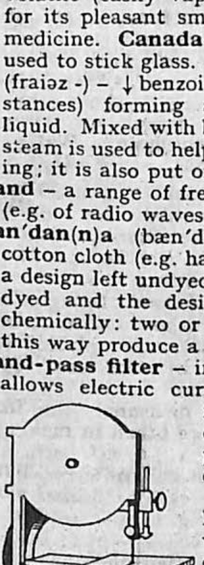
'balsa (wood) ('bɔɔlsə) – a very light wood, as in small model aeroplanes.

'balsam ('bɔɔlsəm) – a sticky resin or volatile (easily vaporized) oil; used for its pleasant smell; also used in medicine. **Canada balsam** – resin used to stick glass. **Friar's balsam** (fraiəz -) – ↓ benzoin (and other substances) forming a brown sticky liquid. Mixed with boiling water, the steam is used to help difficult breathing; it is also put on small wounds.

band – a range of frequency of waves (e.g. of radio waves).

ban'dan(n)a (bæn'dænə) – silk or cotton cloth (e.g. handkerchief) with a design left undyed; or the whole is dyed and the design is taken out chemically: two or more dyeings in this way produce a design.

band-pass filter – instrument which allows electric currents of certain frequencies (a certain band) to pass, but weakens or cuts out others.


BAND SAW

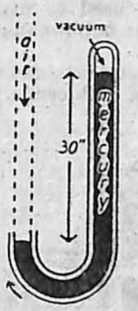
band-saw – long loop of metal with saw-teeth cut in it, used for cutting complicated designs out of wood.

'band 'spectrum – ↓ spectrum.

'band width – ↓ side band.

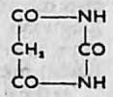
bank a fire – heap up the coal so that a fire burns slowly, e.g. when railway engines (or ship's engines) are not running. **bank an aeroplane** – make the aeroplane slope to the side when turning.

bar-/ – weight, e.g. **ba'rometer** (bə'rɔmitə) – instrument for measuring the weight (pressure) of the atmosphere, e.g. by its effect in pressing mercury up in a tube (see picture). The unit of measure is the **bar** (or **millibar** = 1/1000th of a bar): one bar = the pressure of 75·007 centimetres of mercury (at a standard temperature and place on the Earth). **'barograph** ('bærəgraaf) – an ↓ aneroid barometer which draws a line (a **barogram**) showing **'baro'metric** changes during the day. For picture see aneroid.



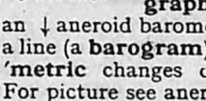
BAROMETER

bar'biturates (baa'bitiureits) – group of drugs, e.g. allonal, veronal, luminal (trade names). These are salts of **'barbi'turic acid**: they are given by mouth (or injected) to cause sleep. Evipan (trade name) is injected to cause anaesthesia (unconsciousness for surgery). The barbiturates are habit-forming. ↓ malonic acid.



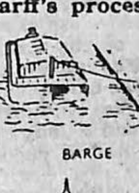
BARBITURIC ACID

Barff's process (baafz -) – forming a protective covering of black oxide of iron by blowing steam on red-hot iron.


BARGE

barge (baadʒ), **ca'nal 'barge** – large boat with a flat bottom and square sides used for carrying goods on inland waterways, at one time pulled by a horse.

barge-boards – the boards at the end


BARGE BOARD

of a sloping roof which hide the join between the walls and the roof.

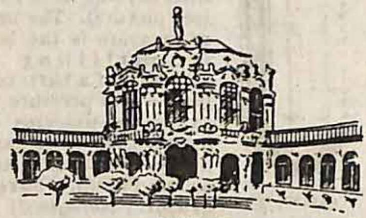
'barium ('beəriəm) – a heavy metal element. **barium meal** – barium sulphate mixed with water, eaten so as to make the stomach and bowel show up in X-rays. ↓barytes.

bark – ↓barque.

barm (baam) – yeast used to make bread "rise" (have air-bubbles in it).

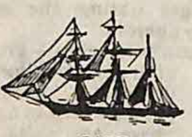
baro-/ – ↓bar-/.

ba'roque (bə'rɔk) – very ornamental form of building as in 17th century.



BAROQUE

barque (baak) – ship with (usually) three masts, with sails set across the first two masts and longways on the third (back) mast.



BARQUE

'barrage ('bæraaʒ) – wall or bank across a river so as to make the water deeper above it.

'barrel ('bærəl) – the box which contains the spring of a clock or a watch. **barrel arbor** – the axle at the centre of a clock-spring.

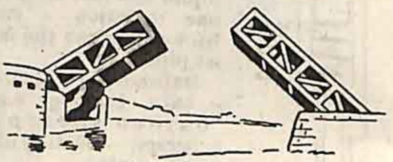
'barysphere ('bærisfiə) – supposed heavy central mass of the Earth, heavier than the **lithosphere** (= layer of rock outside the barysphere).

ba'rytes (bə'raitiiz) – heavy mineral (barium sulphate) found in long crystals in lead mines, used in making white paint.

'basal me'tabolism ('beisl-me'tæbəlizm) – the set of chemical and physical changes within the body which are necessary and just sufficient to maintain life. The **Basal Meta'bolic Rate** is tested by measuring the amount of oxygen used up, and of carbon dioxide produced when the person tested is at complete rest under certain standard conditions of temperature, etc.

'basalt ('bæsɔɔlt) – very ancient dark-coloured igneous (heat-formed) rock with fine grains.

'bascule ('bæskjul) – a bridge of which one end lifts up (or both ends, thus opening in the middle) so that ships may pass.



BASCULE

base (chemical) – a substance which, with an ↓acid, forms a salt and water. Oxides of metals and hydroxides (metal + OH) are bases, e.g.

Copper oxide + Sulphuric acid
CuO H_2SO_4
↓
Copper sulphate + Water
$CuSO_4$ H_2O

base (mathematics) – a number from which other numbers are built up; e.g. the base of common ↓logarithms is 10: *e* (2·718..) is the base of the Napierian logarithms. ↓*e*.

base exchange – the replacing of one chemical base (the metal part of a salt) by another, e.g. replacing calcium (lime) by sodium. ↓ion exchange; zeolite.

base line – a measured line from which angles are taken in making a map.

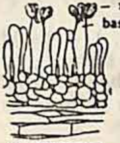
base metal – not gold or silver, but a metal which is easily oxidized when heated in air, e.g. copper, lead, zinc.

basi-/, 'basic ('beisik) – at or belonging to the base (bottom); having to do with a chemical ↓base.

basic dyes – alkaline dyes fixed by an acid (e.g. by hydrochloric acid) as used for printing designs on cotton.

basic slag – compound of lime and phosphorus formed in furnaces in the process of making steel, used as a fertilizer to improve plant growth, especially on damp, heavy, acid ground.

Ba′sidiomy′cetes (bei′sidiomai′siitiiz) – a large group of fungi which includes mushrooms, toadstools, and the fungi which cause disease of wheat, etc. The spores (**ba′sidio spores**) are formed on the outside of a rounded or club-shaped cell called a **ba′sidium.**



BASIDIA

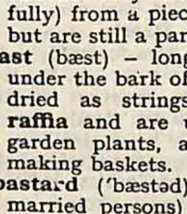
′basiphil, ′basophil (beisifil) – e.g. **basiphil cells** – white blood corpuscles (cells) which stain easily with ↓ basic dyes; not often found except in disease; basiphil red cells are found in certain cases of poisoning.

′bas re′lief (′bæs ri′liif) – figures so cut that they stand out slightly (not fully) from a piece of stone or wood but are still a part of it.

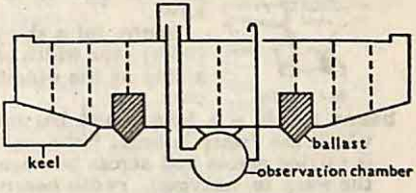
bast (bæst) – long fibres from just under the bark of a tree; such fibres dried as strings are also called **raffia** and are used for tying up garden plants, also (coloured) for making baskets.

′bastard (′bæstəd) – (child of unmarried persons): not according to the usual rule or law, e.g. **bastard size** (of paper) – not one of the sizes ordinarily made, or used by printers; so also **bastard thread** (= spiral cut) of screw. **bastard file** – a file with 30 cuts per inch (neither very fine nor very rough).

bat (bæt) – flying rat-like animal.


BAT

′batho-/, bathy-/ (bæθo-) – having to do with depth, e.g. of the sea. **′bathysphere** – strong steel container used for going deep into the sea. **′bathy′scaphe** (′bæθi′skeif) – kind of underwater boat, used for deep-sea studies, consisting of a buoyant container filled with petrol supporting a small cabin for men underneath.



BATHYSCAPHE

ba′trachian (bæ′treikiən) – having to do with frogs and frog-like creatures.

′batten (′bætən) – a wooden bar to which laths (long, thin pieces of wood) are nailed in a wall or ceiling; (theatre) line of lamps hanging above the stage.

′batter (′bætə) – slope of the side of a wall which is thinner at the top than at the bottom.

′Baudot code (′boudou) – way of sending letters by telegraph by means of dots put in any of five places; e.g. A = one dot at the top, B = dots in positions 3 and 4.

A	B	C
•	×	•
×	×	×
×	•	•
×	•	•
×	×	×

BAUDOT CODE

baulk, balk (bɔɔk) – square piece of wood bigger than 6 × 6 inches: ↓ billet.

′bauxite (′bɔɔksait) – the clay (ore) from which aluminium is made.

bay (bei) – any one of the chief parts into which a building is divided; part of the floor or roof between two main beams; part of a room which stands out from the rest.

′bayonet (′beiənit) – knife fixed to the end of a rifle. **bayonet cap, bayonet holder** – the metal end of an electric lamp which has two pins standing out which fit into two J-shaped holes in the holder.

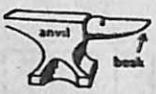
Be – chemical sign for ↓ beryllium.

′beading (′biidiŋ) – (1) long piece(s of wood with one edge rounded; (2) bending over the edge of a tin box or bucket so as to form a rounded edge.

′beaker (′biikə) – small glass cup as used in a chemical laboratory.

BEAKER

beak-iron (biik -), **beck-iron** – the pointed end of an anvil.

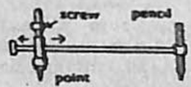


BEAK IRON

beam (of a ship) (biim) – the width of a ship at the widest part.

beam (cloth) – a long round bar on which the *warp is held: *(the weft is carried across and across between the warp in weaving). **radio beam** – radio waves sent out in a narrow beam in one direction only.

beam compasses – = trammel – instrument for drawing large circles. **beam riding** – way of guiding a ↓missile by sending out a narrow beam of radio waves within which the missile travels.

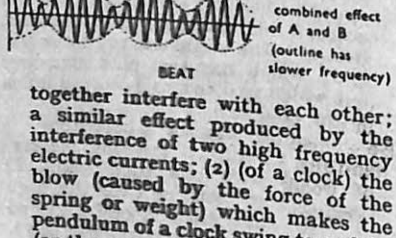


BEAM COMPASS

'bearing (compass) ('beəriŋ) – direction, angle as shown by a compass. A bearing of 90° = east; 180° = south; 270° = west.

bearing(s) (engine) – the part of a machine in which a revolving rod is held, or which turns on a fixed rod: ↓ball-bearings, thrust bearing.

beat – (1) the regular sound heard when two notes of music very close together interfere with each other; a similar effect produced by the interference of two high frequency electric currents; (2) (of a clock) the blow (caused by the force of the spring or weight) which makes the pendulum of a clock swing to and fro (or the escape-wheel of a watch turn to and fro): ↓**dead beat** escapement.


vibration A
vibration B (slightly lower frequency)
combined effect of A and B (outline has slower frequency)

BEAT

'Beaufort scale ('boufət) – a set of numbers from 0 to 12 describing the speed (miles per hour) of the wind: I–III—2 to 12 m.p.h.; VI–VII—24–37 m.p.h.; X–XI—56–75 m.p.h.; XII—over 75 m.p.h.

'beaver-board ('biivə -) – building boards made of wood fibre.

beaver-cloth – very heavy woollen cloth with a smooth surface as in heavy black overcoats.

beck (bek) – ↓beak.

'beckets ('bekitz) – (1) loops of rope round the edge of a boat or of a life-buoy for a person in the water to hold on to; (2) a loop through which a toggle (short wooden bar) is put.

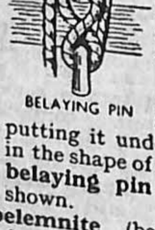
BECKET

'Bedford 'cord ('bedfəd -) – cotton cloth with raised lines on it, as used inside some motor-cars, also in clothes for horse-riding.

beetle – large wooden hammer.

Beetle plastic, Beetle ware – amino-plastic (↓urea-formaldehyde) made in bright colours, e.g. for tea-cups; it is very resistant to the passage of electricity: (trade name).

be'haviourism (bi'heiviərizm) – a form of psychology (the study of the mind). The behaviourist believes that the psychologist should study facts and try experiments as in other sciences; that the whole of man's mind can be explained as a collection of in-born, learned and un-learned (learned not to) responses (actions in answer to things or events).

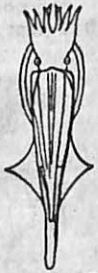


BELAYING PIN

bel (bel) – unit for measuring loudness of sound. ↓decibel.

be'lay (bi'lei) – fix a rope by putting it under and over in the shape of an 8 on to a **belaying pin** = bar as shown.

'belemnite (beləmnait) – fossil shaped like a rifle-bullet: it comes from an ancient sea-creature like an ↓octopus.



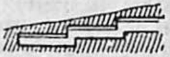
BELEMNITE

BELLADONNA

ˈbellaˈdonna (ˈbelə-ˈdɔnə) – "Deadly Nightshade", a plant of the potato family; it contains ↓ atropine.

Bell's palsy (ˈbelz-ˈpɔɔlzi) – loss of power in the muscles on one side of the face.

ˈbelveˈdere (ˈbelviˈdiə) – a room with open sides on the top of a house.

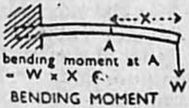


BENCHED FOUNDATION

benched foundation – foundation (on which a wall will be built) built up in steps so that it may not slip down the hill.

ˈbench-mark – a broad arrow with a line across it cut in a stone to show a level in map-making.

bend – knot in a rope; to knot.



BENDING MOMENT

bending moment (- moumənt) – Moment = turning power of a force, e.g. the turning power of a force at the end of a lever. If a beam is bent (e.g. by a weight hung on the end of a beam fixed in a wall) the bending moment at any place is the turning power of the forces on either side of that place. Bending moment at A = $W \times X$.

bends – ↓ caisson.

ˈbenthon, ˈbenthos – plants and animals living on the sea-bottom. ↓ plankton.

ˈbentonite (ˈbentənait) – a clay which increases in size very much with water, forming a jelly; used in making paper and paint, and in purifying petrol, also in medicines rubbed on the skin.

benˈzaldehyde (benˈzældihaid) – oil of bitter almonds, $C_6H_5.CHO$.

ˈBenzedrine (ˈbenzidriin) – a drug which excites the higher centres of the brain; it also contracts the blood vessels of the nose when breathed in; used to ease a cold: (trade name).

ˈbenzene (ˈbenziin) – C_6H_6, a colourless liquid, easily vaporized; obtained from coal-tar; it burns easily; dissolves fats.

benzene ring – The benzene molecule consists of a ring of 6 carbon atoms with a hydrogen atom joined to each. It can be shown as in (a) and (b); but the exact positions of the double bonds are not known, so (c) or (d) can be used, but the chemist often writes (e). The signs (d) and (e) mean that carbon atoms are at the points of the figure with H atoms joined to each unless other atoms or groups are shown to be joined there, e.g. ↓ benzoic acid. ↓ resonance.

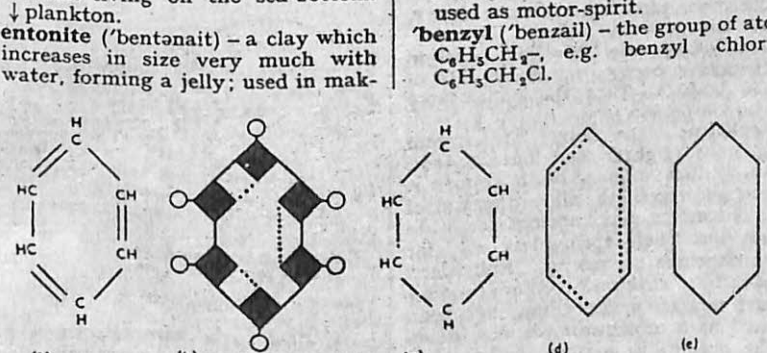
benzine – a mixture of easily vaporized petroleum spirits.

benˈzoic acid (benˈzoik -) – $C_6H_5.COOH$, used in preserving fruit.

ˈbenzoin (ˈbenzoin) – (1) a resin obtained from a Java tree; ↓ Friar's balsam. (2) a chemical compound, related to ↓ benzaldehyde, which forms the chief part of the resin.

ˈbenzol – trade name used for impure benzene and mixtures of similar oils, used as motor-spirit.

ˈbenzyl (ˈbenzail) – the group of atoms $C_6H_5CH_2$–, e.g. benzyl chloride, $C_6H_5CH_2Cl$.



BENZENE RING

'benzyl 'benzoate – substance put on the skin to cure ↓scabies.

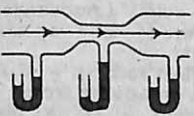
'beriberi ('beriberi) – a disease causing inflammation of the nerves in all parts of the body, including the brain; it is caused by eating polished rice and so not getting enough ↓vitamin B: see also aneurin.

'Berkefeld filter ('bəəkfeld) -- instrument for purifying water; the water is passed through kieselguhr earth (earth made of the bony part of microscopic sea creatures).

Ber'muda rig (bəə'mjudə -) – an arrangement of sails on a sailing-ship. Both sails are triangular, and the main sail is stiffened with thin pieces of wood (battens) put into pockets sewn in the sail. The mast is very tall.

BERMUDA RIG

Ber'nouilli's principle (beə'nui.iiz -) – In a stream of liquid (e.g. through a pipe of varying diameter) the total energy of of the flow per pound of liquid is always the same. Where the velocity (speed) is greatest, the pressure is least; so the liquid flows faster through a narrow part (as shown by the rise of mercury in the J tube); in the wider part it flows more slowly, but the stream is wider.



BERNOUILLI

'Bertillon system ('beətii.ɔ) – system of taking certain measurements of the body so that the police may know a person again.

be'ryllium (be'riliəm) – metal element; lighter and harder than aluminium; alloyed with copper it has great strength; alloyed with steel it is used to make springs which do not lose their springiness, e.g. for hair-springs of watches. Radiations of radium striking beryllium produce fast neutrons. Beryllium has been used as a moderator (to slow down the action) in a nuclear ↓reactor.

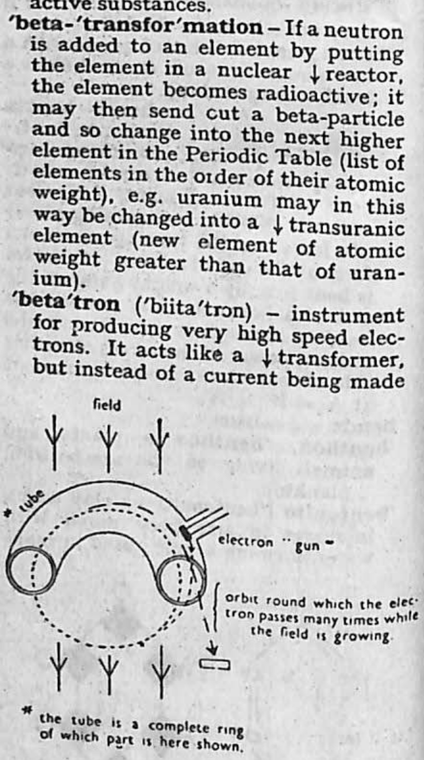
beryllium silicate – the precious stones **beryl,** emerald and aquamarine are composed of beryllium silicate and aluminium silicate.

'Bessemer process ('besimə) – way of making steel. Air is blown through melted iron in a container lined with lime and magnesia; the carbon goes off as a gas (CO) which burns and becomes CO_2; other impurities are oxidized and combine with the lining, leaving almost pure iron; the right amount of carbon is then added.

'beta-particles (-rays) ('biitə) – particles of negative electricity (electrons) sent out at nearly the speed of light from the nuclei of some radioactive substances.

'beta-'transfor'mation – If a neutron is added to an element by putting the element in a nuclear ↓reactor, the element becomes radioactive; it may then send out a beta-particle and so change into the next higher element in the Periodic Table (list of elements in the order of their atomic weight), e.g. uranium may in this way be changed into a ↓transuranic element (new element of atomic weight greater than that of uranium).

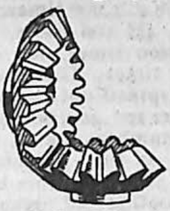
'beta'tron ('biita'trɔn) – instrument for producing very high speed electrons. It acts like a ↓transformer, but instead of a current being made to flow in a wire, electrons pass round and round a glass tube placed


field
* tube
electron " gun "
orbit round which the electron passes many times while the field is growing
* the tube is a complete ring of which part is here shown.

BETATRON

between the ends of a magnet in which alternating current flows. During the time in which the strength of the magnet is increasing, the electrons pass round millions of times, gradually gaining speed.

ˈbevel ˈedge (ˈbevəl) – sloping edge. **bevel gear** – toothed wheels with sloping edges to work at right angles to each other.


BEVEL GEAR

ˈbezel (ˈbezəl) – (1) sloping edge, as on a chisel; (2) groove holding the glass of a watch, or a jewel.

bhang – ↓ hashish.

Bi – chemical sign for ↓ bismuth.

bi-/ (bai-) – two, both, e.g. ↓ biennial.

bi-/ (bai-) – (chemistry) Bi-/ shows an acid-salt in which only part of the hydrogen of the acid has been replaced by a metal, e.g. sulphurous acid, H_2SO_3, sodium sulphite, Na_2SO_3 (a salt), but sodium bisulphite, $Na\mathit{H}SO_3$ (an *acid* salt). So also calcium bisulphite, $Ca(HSO_3)_2$; bicarbonate . . . – HCO_3; bisulphate . . . – HSO_4.

ˈbias (ˈbaiəs) – cause to go to one side rather than the other; weight which causes this; e.g. a ball with bias is heavier on one side and it does not roll straight. ↓ grid.

ˈbib-cock (ˈbib-kɔk) – ordinary tap with curved-down outlet for drawing off water, as in houses.

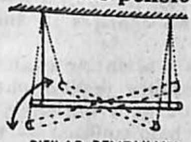
biˈchromate – ↓ dichromate.

biˈcuspid tooth (baiˈkʌspid) – tooth with two points, e.g. the fourth tooth each side of your mouth.

biˈennial plant (baiˈeniəl) – plant which lives two years, producing seed in the second year.

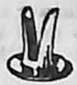
ˈbifid (ˈbifid) – shaped like a Y.

ˈbiˈfilar susˈpension (ˈbaiˈfailə) – way of supporting a thing (e.g. bar) by two strings. If the bar is turned sideways the strings make it swing to and fro as a **bifilar pendulum**.

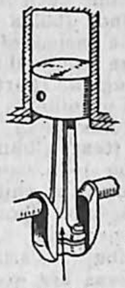


BIFILAR PENDULUM

ˈbifurcated rivet (ˈbaifəkeitid -) – (*furc-*=fork); thing like a nail for joining, but the leg is cut and the two points are opened out on the other side of the material, e.g. a brass paper-clip.


BIFURCATED RIVET

big-end – the part of a connecting rod which joins onto the crank (rod moved round by the piston).


BIG-END

bight (bait) – any part of a rope away from the ends.

biˈlateral ˈsymmetry (baiˈlætərəl) – being the same on both sides of a middle line, e.g. most faces are bilaterally symmetrical about the mid-line of the nose.

bile (bail) – green-brown liquid formed in the liver and poured into the bowel where it breaks up fat into small particles so that the fat can be changed by the digestive liquids.

bilˈharzia (bilˈhaaziə) – disease in hot countries, caused by a small organism which passes from the body of a snail into water, and from water into the body of a man.

ˈbillet of wood (ˈbilit) – piece with three smooth-cut sides; the fourth side is rough (not sawn); a ↓ baulk has four sawn sides.

ˈbimeˈtallic strip (ˈbaimeˈtælik -) – bar made of two metals fastened together side by side. When the bar is heated, the unequal expansions of the metals cause the bar to bend. Used, e.g., in fire-alarms.

ˈbinary (ˈbainəri) – of two. **binary alloy** – an alloy of two metals. **binary compound** – a chemical compound of two substances. **binary star** – a double star, two stars revolving round each other. **binary system of numbers** – In the ordinary (**denary**) system based upon 10 the number 1111 means $1 \times 10^3 + 1 \times 10^2 + 1 \times 10^1 + 1$. In the binary system (based upon 2)

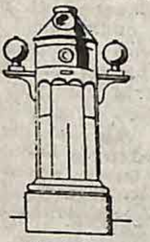
1111 means 1 × 2^3 + 1 × 2^2 + 1 × 2^1 + 1 (= 15 in the denary system). The binary system is used in some calculating machines which work with radio valves.

bi'naural (bai'nɔɔrəl) – for both ears, e.g. a binaural ↓stethoscope has two listening tubes, one for each ear.

binding energy (of atomic nucleus) – the energy which binds (holds together) the parts of the nucleus of an atom and would be set free if all the parts were separated again. (Part of the binding energy of uranium is set free when uranium atoms split.)

'Binet-'Simon scale (test) ('biinet-'siimɔn -) – a way of measuring a child's intelligence (power of knowing and thinking). Certain questions are given for each year of age. ↓intelligence quotient.

'binnacle ('binəkl) – the case in which the compass is kept in a ship.


BINNACLE

bi'nocular (bi'nɔkiulə) – of or for both eyes. **binoculars**–glasses for seeing distant objects (as shown).

BINOCULARS

bi'nomial (bai'noumiəl) – ("two-name"): having to do with two names, e.g. **binomial no'menclature** (- no'menklətʃə) – ("two-name naming"): way of using two names for plants and animals: (1) genus, (2) species; e.g. *Rosa* (rose), *canina* (dog) = the dog-rose (= wild rose).

bi'nomial coe'fficients –

$(x + y)^2 = 1x^2 + 2xy + 1y^2$
$(x + y)^3 = 1x^3 + 3x^2y + 3xy^2 + 1y^3$
$(x + y)^4 = 1x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + 1y^4$

and so on. The numbers 1, 2, 1; 1, 3, 3, 1; 1, 4, 6, 4, 1, etc. are the binomial coefficients. One way of finding the binomial coefficients is by ↓Pascal's triangle.

bi'nomial distri'bution – If we throw up 4 coins there are 5 possible results: 4 heads, 3 heads, 2 heads, 1 head, no head (all tails). If we do this many times, e.g. 1,600 times, we find that we get 4H 100 times, 3H 400 times, 2H 600 times, 1H 400 times, no H 100 times. The results are distributed (spread out) according to the numbers 100, 400, 600, 400, 100, and these numbers are in the same proportion as the ↓binomial coefficients 1, 4, 6, 4, 1. This is a binomial distribution of results. ↓Gaussian.

binomial nomenclature – ↓binomial.

binomial 'theorem (- 'θiərem) – a means of writing out, for example, $(a + x)^3$, or $(a + x)^6$ by rule without multiplying; e.g. $(a + x)^6 = a^6 + 6a^5x + \frac{6 \times 5}{1 \times 2}a^4x^2 + \frac{6 \times 5 \times 4}{1 \times 2 \times 3}a^3x^3 \ldots$

'bio-/- ('baio) – having to do with life.

'bio'chemistry ('baiokemistri) – the study of the chemical changes which take place in living things.

'bio'logical control – the use of living things to control the growth, etc., of other living things, e.g. using insects to control weeds.

'bio'logical shield – wall (e.g. of thick concrete) put round a source of atomic rays (e.g. a ↓reactor) to protect the men working the machine.

bi'ology (bai'ɔlədʒi) – the scientific study of life; it includes Biochemistry, Botany, Zoology, Evolution, Heredity, etc.

bi'ometry (bai'ɔmetri) – mathematical study of measures made in ↓biology.

'bio'physics ('baio'fiziks) – the study of the physical properties (e.g. rate of flow, voltage) of parts of a living body and of the changes in these properties.

'biopsy ('baiɔpsi) – scientific examination of a substance (e.g. diseased growth) cut from the living body.

'bio'synthesis ('baio'sinθisis) – the synthesis (building-up) of complex compounds from simple substances in a living body.

bi'otic (bai'ɔtik) – having to do with life, e.g. **'antibi'otics** – substances such as ↓penicillin by which a living thing protects itself against other living things; used in medicine to destroy bacteria.

'biotin ('baiɔtin) a vitamin of the B group. It is necessary to the activity of yeast, also to certain bacteria and to the health of man; its absence causes skin trouble; it is destroyed by uncooked white of egg.

'Bipack ('baipæk) – trade name for an arrangement of films in a camera for taking coloured cinema films. The blue film and red film are joined together with their sensitive surfaces touching. The blue film is in front and has a red coating so that only red light reaches the red film. The green film is separate. The light from the lens is divided so that it falls on both films (blue-red and green) at the same time. ↓subtractive colour process.

'biparous ('bipərəs) – giving birth to two young at a time.

'bire'fringence ('bai-rif'rindʒəns) – double bending of light as it passes into and through certain crystals (e.g. calcite) or other substances. As a result two images may be seen of a thing looked at through the crystal. Muscle protein is birefringent because of the arrangement of its molecules in folded chains.

'Birkeland & 'Eyre furnace ('bəək-lənd -'aiə) – electric ↓arc used to fix nitrogen from the air.

'biscuit ('biskit) – pot which has been hardened by firing (heating) but has not been glazed.

'bismuth ('bizməθ) – grey-white metal element, easily broken; bismuth-lead alloy becomes larger when it solidifies, so is used for making printer's type. Bismuth-lead-tin alloy melts easily and is used for fire-protection instruments.

bismuth-meal – bismuth salts mixed with food, used to get an X-ray picture of the digestive organs.

'bisque (bisk) – ↓biscuit.

bi-stable (bai-) – (arrangement or system) which can come to rest in either of two positions, e.g. a coin can come to rest with either "heads" or "tails" uppermost.

'bistoury ('bisturi) – narrow knife with one edge used for surgery.

BISTOURY

bi'sulphite – ↓bi-/.

bit – tool with a sharp end, turned round with a ↓brace to cut a hole, e.g. in wood; the cutting blade of a plane; the copper end of a ↓soldering iron.

bit (of information) – a unit of information in the study of the sending of information by physical means (e.g. by radio). The answer to a question, Yes or No, when either answer is equally likely, is one bit of information.

bitts – two posts close together fixed onto the deck of a ship so that ropes may be put onto them.

'bitumen ('bitiumen) – solid (or nearly solid) substance related to coal-tar, used for road-making. It is also obtained from petroleum; it is the solid matter left when all the lighter oils have been taken out.

'bivalve ('baivælv) – shell-fish with two shells, e.g. oyster.

black body = cavity radiant = full radiant – a Body which absorbs all the heat-rays and light-rays which fall on it, and reflects none. If it is heated, it gives out the greatest possible amount of heat and light at that temperature. The scientific problem of the black body was to find out how much energy on each wavelength is given out. The results found by experiment can be explained by the ↓quantum theory. Also see Displacement.

'Blackett-'Schuster law ('blækit-'ʃustə) – Any large rotating (spinning) mass, e.g. the Earth, acts as a magnet. (The law is not yet fully proved.)

bladder worm – larval form of the tapeworm.

blanch (blaanʃ) – whiten a plant by growing it in darkness.

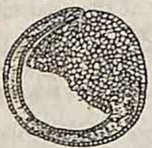
bland fluids (blænd fluuidz) – drinks which do not irritate the stomach, e.g. milk, barley-water.

blast (blaast) – wave of compressed air followed by a wave of reduced (lowered) pressure caused by an explosion, e.g. of a bomb.

blast furnace – a steel container, about 80 feet high, covered inside with fire-brick, filled with iron-ore, limestone and burning coke. Air is blown through it to extract the iron from the ore.

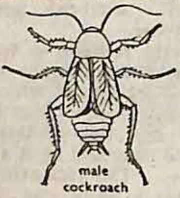
blasting powder – explosive used to break up rock.

'blasto-/ ('blæsto-) – (bud). When a fertilized ovum (egg-cell) begins to develop, it divides into 2 – 4 – 8, etc., and so forms a hollow ball = the **'blastula** ('blæstiulə). The cells are the **'blasto'meres** ('blæsto'miəz). The hollow in the middle is the **'blasto'coel** ('blæsto'siil). When a digestive path is formed, the opening (mouth) is the **'blasto'pore** (-o'pɔɔ).



BLASTULA OF A FROG

'Blattidae ('blætidii) – the family which includes cockroaches (insect which looks like a beetle but has thick front wings, not wing-cases).



BLATTA

'Blattnerphone ('blætnəfoun) – instrument which records speech by magnetizing steel tape: (trade name).

'bleaching powder ('bliitʃiŋ -) – substance made from chlorine and lime, $CaOCl_2$, used to whiten cloth; also called chloride of lime.

bleb (bleb) – small raised spot in the skin with clear liquid in it.

'bleeder – person suffering from ↓ haemophilia; resistor used to draw off electricity at a chosen rate.

blende – ↓ zinc, sphalerite.

'bleno'rrhoea ('blenə'riiə) – (*blen-* = mucus = watery jelly material as from a cold in the nose); flow of mucus from the eyes, bowel or other part.

'blephar-/ – having to do with the eyelid, e.g. **'blepha'ritis** ('blefə'raitis) – inflammation of the eyelid.

'blind 'spot – point in the retina (nerve-endings at the back of the eye) where the nerve comes in; there are no rods and cones (special nerve endings sensitive to light) at this point. For diagram see Yellow.

block and tackle – pulley and ropes.

block coef'ficient – figure showing relationship of the under-water part of a ship (its displacement) to an oblong box: if the ship were a flat-sided box, the figure would be 1·0: the coefficient of a fast ship is about 0·56: of a slow trade ship is about 0·75.

block diagram – squares showing the order and arrangement of processes in an instrument (e.g. a radio set), e.g. see jet propulsion, television.

block-plan – drawing showing buildings now on a piece of land and where new buildings are to be put.

block plane – plane made of metal with the blade at low angle, used for smoothing across the fibres. ("Block" comes from meat-seller's block on which meat is cut.)

BLOCK PLANE

block system – division of a length of railway into parts (blocks) with a signal-post at each end. No train may go into a block until the block is clear.

blood groups – There are four classes of human blood. If blood of the wrong class is transfused (put into the body of a sick person) serious illness results because the one blood causes the cells of the other to agglutinate (stick together) and then dissolve.

bloom (on a fruit) – the surface dust, e.g. on a ripe grape; surface powder or dullness on a damp wall, leather, paint, etc.

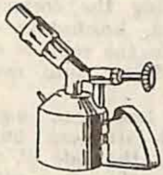
blooming – causing (by accident or on purpose) a non-reflecting surface film on leather, paint, or glass.

blooming mills – machines for rolling out iron and steel into thick sheets.

blowfly – big fly with a blue body, which lays eggs on meat.

blow-hole – hole in solid metal caused by air or gas during the melted state.

blow-pipe, blowlamp – lamp (or gas-pipe) from which vapour (or gas) and air is blown out under pressure so as to give a small area of very hot flame.


BLOWLAMP

'blueing ('bluuiŋ) – (1) producing a blue surface colour on steel by heating it in wood-ash; (2) substance (↓ultramarine) used to give a faint blue colour to white clothes in washing.

blue 'lias (- 'laiəs) – blue clay and thin limestone in the Jurassic system (layers of the Earth formed about 145 million years ago).

blueprint – plan consisting of white lines on a blue background made by printing photographically on *ferro-prussiate paper: *(form of iron cyanide).

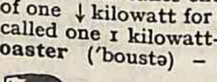
blue 'vitriol ('vitriəl) – crystalline copper sulphate.

'blunger ('blʌndʒə) – machine with revolving knives for mixing potter's clay.

board foot – unit-measure of wood, 1 × 12 × 12 inches.

Board of Trade Unit – the amount of electrical energy used by an instrument which takes energy at the rate of one ↓kilowatt for one hour. Also called one 1 kilowatt-hour.

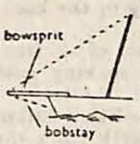
'boaster ('boustə) – chisel with a broad edge, used to cut stone. **boasted ashlars** – building stones with regular chisel marks at an angle to the edge.


BOASTER

bob (bɔb) – weight at the end of a string, used, e.g., to see if a wall is straight up and down; the weight on the pendulum of a clock.

'bobbin ('bɔbin) – piece of wood on which thread is wounc, e.g. for weaving.

'bobstay ('bɔbstei) – rope or wire which prevents the pull of the mast from pulling the bowsprit upwards.

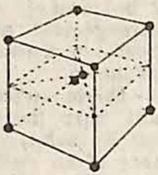


BOBSTAY

'bodkin ('bɔdkin) – a very large needle or pointed iron pin.

'Body – thing, mass, e.g. "The moon is a large round Body in the sky." "If a heavy Body hits a lighter Body . . ." The big letter B is used in this book to show the difference from a living body.

body (of paint) – opacity (thickness so that under-colour does not show through).


BODY CENTRED

body - centred crystal – arrangement of atoms in a crystal – one at each corner of a cube and one in the middle, as in many metals.

'bogie ('bougi) – 4 or 6 wheels on a frame under a railway carriage (used to make a long carriage go easily round a curve.

BOGIE

Bohr theory (boə/-) – An atom consists of a nucleus ⊕ with a number of electrons ⊖ going round it in various orbits, nearer or further from the nucleus. The orbit of each electron depends on the energy of that electron. If an electron jumps from a larger orbit to a smaller orbit, it gives out radiation. The energy of that radiation is equal to the difference between the energy of an electron in the larger orbit and that of an electron in the smaller orbit. ↓photon. (Danish, 1885– .)

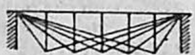
boiling point – the temperature at which a liquid boils; this varies with the pressure of the atmosphere, e.g. on top of a mountain water boils at a lower temperature than at sea-level. The boiling point is fixed as the temperature at which a liquid boils at a certain atmospheric pressure (76 centimetres of mercury in the barometer).

bole (boul) – (1) trunk of a tree; (2) red clay used in making gold edges on books.

'bolide ('boulaid) – thing like a ball of fire, falling on the Earth from the sky and (usually) exploding.

BOLL

boll (bɔl) – fruit of cotton plant. **boll weevil** – worm-like insect which attacks the cotton boll.


BOLMAN TRUSS

'Bolman truss ('bɔlmən -) – arrangement of beams in a roof as shown.

bo'lometer (bo'lɔmitə) – thermometer for measuring radiant heat (heat rays), e.g. from the sun, by means of the increased resistance of an electric wire which is heated by the radiation.

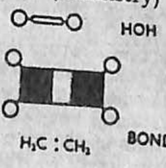
bolted flour ('boultid -) – flour passed through silk cloth to take out the larger particles.

'bolus ('bouləs) – a ball of food or medicine.

'bomba'zine ('bɔmbə'ziin) – cloth made of silk (long threads) and wool across.

bomb 'calo'rimeter (bɔm 'kælə'rimitə) – steel container in which a weighed amount of a substance (e.g. coal) is burned in oxygen while the container is in water: the rise of temperature of the water is noted to get the calorific (heat-making) value of the substance. For a picture see calorimeter.

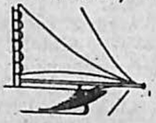
bond (bɔnd) – (building): way of laying bricks so that the walls hold together: ↓ English, Flemish, garden-wall.



BOND

bond (chemistry) – the force which holds atoms together in a molecule, e.g. shared electrons. Water is made up of two atoms of hydrogen and one atom of oxygen, HOH: the oxygen atom has two bonds; each atom of hydrogen has one bond. But in $H_2C{:}CH_2$ (ethylene) the two carbon atoms are joined by a **double bond.** ↓ valency.

boning rods ('bouniŋ) – T-shaped rods used in getting the correct slope, e.g. of a road. **boning-in** – getting a level from the tops of a number of pegs driven into the ground in line.


BOOM

boom (buum) – any long beam, e.g. pole standing out over the side of a ship, the other end being fixed to the mast.

boost (buust) – increase the flow of water by a (second) pump at a distance along the pipe from the first; so also, increase the flow of electricity by a second (etc.) helping-generator (or a transformer) at a distance along the supply-wire.

bo'racic 'acid, 'boric 'acid (bɔr'æsik-, 'bɔrik -) – H_3BO_3: white powder used as a very weak antiseptic, e.g. (dissolved in water) for the eye.

'borax ('bɔɔræks) – a form of sodium borate, used in glass-making, also in medicine as a weak antiseptic: $Na_2B_4O_7 . 10H_2O$.

'borax bead – small piece of borax melted on the end of a wire: an unknown substance (e.g. a compound of iron) is added to it: the substance forms a metal oxide and gives a certain colour in the bead, e.g. iron gives yellow-brown; cobalt, blue, etc.

'borbo'rygmus – noise made by gases in the bowel, e.g. after a meal.

Bor'deaux mixture (bɔɔ'dou -) – copper sulphate and lime mixture used to protect potatoes (etc.) against disease.

bore (bɔɔ) – (1) a tidal wave coming up a river from the sea: (2) hole inside a cylinder, e.g. gun at the loading end; "·303 bore" = (rifle) with hole of 0·303 inch diameter not measuring the depth of the spiral-cut of the rifling. **12-bore shotgun** – gun with a barrel large enough to take a round shot weighing 1/12 of a pound.

'boric ('bɔrik) – ↓ boracic.

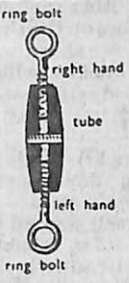
'boron ('bɔrɔn) – an element; a brown powder; best known in the form of boric acid (H_3BO_3) and borax. It is a "trace ' element; if it is absent from the soil, plants, e.g. beans, are unable to grow well.

'borrow pit ('bɔrou -) – place from which extra earth is taken, e.g. in building a banked road.

bort (bɔɔt) – small form of diamond used in cutting-tools.

boss (bɔs) – a thickened piece of metal standing out above the rest; e.g. the half-round centre of a shield; the centre part of the air-screw of an aeroplane.

bottle screw – tube with a right-hand screw in one end, left-hand in the other. When the tube is turned by means of a small bar put through the holes in the handle the two ring-bolts are drawn in to the middle: used (instead of ↓ dead-eyes) for tightening the wire ropes holding the mast of a ship.



BOTTLE SCREW

'botulism ('bɔtiulizm) – (*botul* = sausage): serious form of food-poisoning due to a poison produced by *Clostridium botulinum*, an anaerobic (living without air) organism found in preserved (e.g. tinned) meats and vegetables.

bou'clé (buu'kle) – curled, with curls.

'bougie ('buuʒii) – ("candle"): rod, e.g. of soft rubber (or wax rod containing a medicine), for passing into one of the openings of the body.

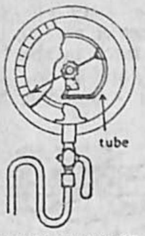
/-boul-/ (-baul-) – the will, the power of deciding, e.g. **a'boulia** – mental state in which the sufferer is unable to decide or use his will-power.

'boulder ('bouldə) – large stone (over 10 centimetres diameter). **boulder-clay** – mixture of boulders and clay left behind by a glacier.

boule (buul) – pear-shaped artificial ruby or sapphire (red or blue precious stones). **boule, boulle** (buul) – furniture, boxes (etc.) decorated by setting gold, silver, pearl-shell (mother-of-pearl), etc., into the surface of wood (or tortoise-shell).

'boundary layer – layer of air nearest the wing of an aeroplane; it moves more slowly than the rest of the flow of air because of the friction against the surface of the wing.

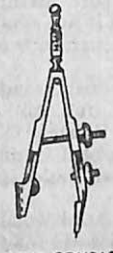
'Bourdon gauge ('buədɔn geidʒ) – instrument for measuring pressure of, e.g., steam in an engine. The steam-pressure causes the curved tube to become less curved. This causes the needle to move round the scale.



BOURDON GAUGE

'Bovidae ('bouvidii) – goats, sheep, cattle and animals of that group.

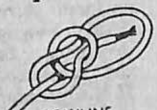
bow compass (bou-) – small compass, used for drawing circles.



BOW COMPASS

Bowden wire ('baudən -) – wire running in a tube made of spiral wire, used e.g. for working the back brake of a bicycle: (trade name).

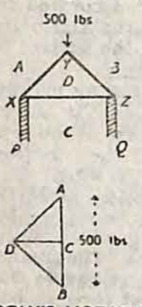
'bowline ('boulin) – knot used to make a fixed (not running) loop at the end of a rope. (See diagram): the free end comes up out of the loop, goes round the back of the rope, then down through the loop.



BOWLINE

bow saw (bou sɔɔ) – saw with an H-shaped frame; the top pieces are drawn together with twisted string; for picture see frame saw.

Bow's no'tation ('bouz no'teiʃən) – Example: XYZ is a metal frame (e.g. of a bridge or roof) supported at P and Q and carrying a weight of 500 lb. at *Y*. We have to find the forces in the bars of the frame and the weight on each support. The spaces between the forces are named *A*, *B*, *C*, *D*. We draw a line *AB* (see lower diagram) to represent the force (500 lb.) between the spaces *A* and *B*. We draw lines *AD*, *BD* and *DC* to represent the other forces (in the same way). We measure *AD* and so find the force between the spaces *A* and *D*, i.e. the force in the bar *XY*; and so on.



BOW'S NOTATION

ˈbowsprit (ˈbousprit) – wooden bar standing out in front of a ship, as shown.

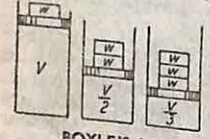
BOWSPRIT

box calf (bɔks kaaf) – soft leather pressed when wet so that it has small square markings on its surface – as on strong shoes.

ˈbox ˈspanner (-ˈspænə) – tube made to fit all round the nut on a machine; to loosen or tighten the nut a cross-bar (tommy-bar) is put as a handle through two holes in the tube.

ˈbox-wood – yellow very hard wood; rulers and wooden handles are made from it.

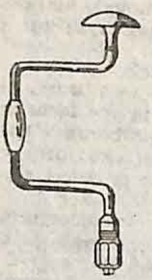
Boyle's law (ˈbɔilz -) – "The volume of a given mass of gas kept at a uniform temperature varies inversely as the pressure." If the pressure is doubled, the volume is halved; if pressure × 3, then volume ÷ 3, etc. (Irish, 1627–1691.)



BOYLE'S LAW

Br – chemical sign for ↓ bromine.

brace (breis) – (1) a bar used to pull and hold two parts of a building or machine together; (2) the sign { in printing; (3) rope used to pull the yards (bars to which the sails are fixed); (4) tool used with a bit (cutting piece) for making holes in wood.


BRACE

brachi-/ (breiki-) – of the arm, e.g. **brachial**, adj.

ˈbrachiˈation – moving by swinging about with the arms, as do monkeys.

ˈBrachioˈpoda (ˈbrækioˈpoudə) – ("arm-foot"): class of small shell-fish, most of them found only as fossils; most present-day members are fixed on to some other shell-fish; also found in sand-tubes on the shore.

brachy-/ (bræki-) – short, e.g. **ˈbrachyceˈphalic** (ˈbrækisiˈfælik) – short-headed, with breadth of skull $\frac{4}{5}$ (or over) of length.

bract (brækt) – little leaf where the flower - stem joins the main stem.

brad (bræd) – small nail with flat sides, about $\frac{1}{2}$ inch long. **bradawl** – tool for making small holes in wood.

BRADAWL

brady-/ (brædi-) – slow, e.g. **ˈbradyˈcardia** (-ˈkaadiə) – slow heart-beat.

Bragg's law (brægz -) – a law which tells the conditions under which a crystal will reflect X-rays most strongly. "If the distance apart of the planes (layers) of the crystal is . . ., and the wavelength of the X-rays is . . ., the best angle will be . . ."

Bragg's method – method of studying the structure of a crystal by means of X-rays.

brake horse-power – the useful (usable) power of an engine as measured by means of a brake put on the driving wheel.

ˈBramah press (ˈbraamə -) – press, e.g. for packing wool; driven by pumping water into a cylinder. For picture see hydraulic press.

branchi-/ (brænki-) – having to do with the **'branchia** = breathing organs (gills) of fishes.

'Brassica ('bræsikə) – plants of the cabbage family.

'brattice ('brætis) – wall of wood, cloth, etc., used to send a flow of air into a certain part of a (coal) mine.

braze (breiz) – join two pieces of metal with melted brass.

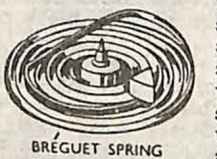
'breastsummer ('bresəmə) – strong beam, e.g. across the top of a doorway.

'breccia ('bretsiə) – rock made up of broken pieces of other rock joined together by other material.

breeder reactor – a nuclear ↓reactor which, at the same time as it uses fissile material (which can be split up), changes non-fissile material (e.g. uranium or thorium) into fissile material. There is thus a gain of fissile material.

breeze – small pieces of coke. **breeze-blocks** – building-blocks made of cement and breeze.

'Bréguet spring ('breigei) – special form of hair-spring (↓balance-wheel spring) in a watch. The outside coil is bent up and carried across the other coils to the centre; this makes it easy to make a watch go faster or slower by tightening the spring; it is also less likely to go out of shape.


BRÉGUET SPRING

brei (brei) – body tissue cut up into very small pieces (minced) so that its chemical nature and actions can be studied.

'brem'sstrahlung ('brem'ʃtraaluŋ) – "braking radiation" (German) – the radiation given off when a charged particle is turned from its path as it passes near an atomic nucleus.

'bressummer – ↓breastsummer.

brevi-/ ('brevi-) – short, e.g. **'brevi'pennate** – with short wings.

Brewster's bands ('bruustəz -) – bands caused by ↓interference of light when light passes through two parallel flat pieces of glass of certain relative thicknesses.

brig – sailing ship with two masts, both with square sails set across the mast. A **'brigan'tine** ('brigən'tiin) has square sails in front but fore and aft (longways) sails at the back.

BRIG

bright e'mitter (- i'mitə) – bright-hot wire sending out electrons in a radio valve; a dull emitter does not show any light when it is working.

Bright's disease – inflammation of the kidneys.

'brilliant 'note – musical note having many high *overtones: *(sounds above the main note which give the whole a certain special character).

Bri'nell hardness test (bri'nel) – measure of hardness made by driving a steel ball into the surface with certain known force and measuring the area of the hollow place so made.

bri'quette (bri'ket) – coal dust mixed with a substance which holds it together (e.g. **tar**) pressed into blocks for burning in a fireplace.

'Bristol 'board (bristl -) – fine cardboard used for artist's drawings.

Bri'tannia metal – white metal used, e.g., to make spoons, teapots, etc.; tin + antimony + copper (and sometimes zinc and lead).

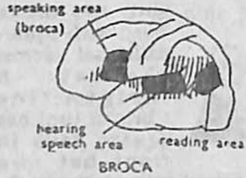
British Association screw threads – small sizes of screws numbered 1 to 25 and based on millimetres (not on inches). ↓Whitworth.

British Thermal Unit – the heat needed to raise 1 pound of water through 1 degree Fahrenheit. ↓therm.

broach (broutʃ) – tool with a square or six-sided or special-shaped blade, smaller towards the point, pushed or pulled through a hole to make the hole larger or of a certain shape.

'broadcloth – very strong woollen cloth with a smooth surface as used, e.g., for the red coats of soldiers and the special clothing of manservants.

'Broca's area ('brokəz -) – part of the left front side of the brain which controls speech.

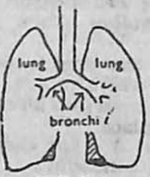


BROCA

bro'cade (brə'keid) – cloth woven with long threads loosely held down to the surface so as to make a pattern. **'broché** ('brɔʃe) – sewn this way.

'bromine ('broumiin) – non-metal element, dark red liquid with an unpleasant smell. **'bromate** – salt of bromic acid, e.g. potassium bromate $KBrO_3$. **'bromides** ('broumaidz) – salts of hydrobromic acid (HBr), e.g. silver bromide (AgBr) used in photography. In medicine bromides are used to calm excitement.

'bronchi ('brɔŋkai) – branches of the windpipe leading to the lungs. **bronchitis** (brɔŋkaitis) – inflammation of the bronchi. **'bronchi'ectasis** – ↓ /-ectasis. **bronchioles** (-kioulz) – small tubes into which the bronchi divide up.



BRONCHI

'bronto-/ ('brɔntou-) – ("thunder"). **'brontosaurus** (-'sɔɔrəs) – very large ancient lizard.

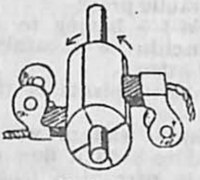
Bronze Age – time about 2,000 B.C. when men used tools made of bronze (copper + tin) before iron was known.

'Brownian movement ('braunjən) – continuous movement of very small particles (e.g. of Indian ink) in a liquid. The molecules of the water hit the particles of the ink and so cause the movement.

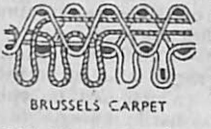
bru'cella (bruu'selə) – (1) bacteria which cause Malta fever; (2) bacteria which cause death of young cattle before birth.

'Bruckner cycle ('bruknə -) – series of weather changes believed to happen every 35 years.

brush – part of an electric generator which presses against a revolving drum and picks up electricity from it (or, in a motor supplies electricity to it). **brush discharge** – flow of electricity across a narrow space with a hissing noise, caused when the electric pressure is not great enough to make a spark.


BRUSHES

'Brussels carpet ('brʌsəlz -) – carpet in which the wool is brought to the surface in loops, each colour running under the other so that there are as many layers as there are colours.


BRUSSELS CARPET

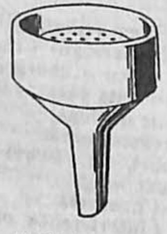
bry-/ -o-/ – having to do with moss, e.g. **'Bryophyta** ('braio'faitə) – mosses (and other plants of that kind). **bry'ology** – study of mosses.

bubble harbour – way of protecting a harbour by setting free air bubbles from underwater pipes to break up the waves.

'bubo ('bjubou) – swelling, e.g. of the upper inside of the leg. **bu'bonic plague** (biu'bɔnik -) – disease carried by rat-fleas; it causes swelling of the ↓lymphatic glands, e.g. in the leg, and illness leading usually to death. The Great Plague of London was bubonic plague.

bucc-/ (bʌk-) – of the cheek, e.g. **'buccal 'cavity** – space inside the cheeks.

'Buchner funnel ('buknə·-) – funnel as shown with a plate with holes in it over which a *filter-paper is put: *(paper through which liquid is passed to separate out solid matter).

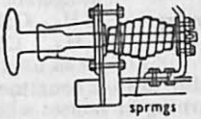

BUCHNER FUNNEL

'bucking bar ('bʌkiŋ -) – bar put at the head end of a rivet when the soft end is being hammered.

'buckram ('bʌkrəm) – coarse cloth stiffened with glue, used e.g. inside the collar of a coat to make it stand up.

'budding ('bʌdiŋ) – (1) producing cells (by simple plants) which break away and become new plants; so also simple animals, e.g. ↓hydra; (2) cutting a bud from one plant and making it grow on another plant (grafting).

buff (bʌf) – to polish (e.g. silver spoons) on a revolving wheel (= **buffer**).



BUFFER

'buffer ('bʌfə) – (1) piston as shown with a spring behind it as on railway carriages; (2) substance used to slow down a chemical reaction, especially one in which a gradual change is being made from acid to alkaline (or alkaline to acid) state.

'bufo ('bjufou) – toad, e.g. **'bufo'toxin** – the poison of a toad.

BUFO

buhl (buul) – ↓boulle.

building line – line showing how far forward a house may stand out towards the street.

'bulbar ('bʌlbə) – of the medulla oblongata (the lowest part of the brain, joining on to the spinal cord).

'bulk factor – relation of the volume of plastic in powder form to the volume of the thing moulded from it.

'bulkheads – walls across inside a ship dividing the ship into parts for storing loose materials; also so that, if one part fills with water, the water does not flow into other parts.

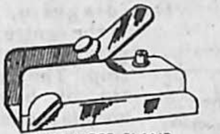
'bulla ('bʌlə) – raised round spot, e.g. on the skin; a bubble.

BULLDOZER

'bulldozer ('buldouzə) – machine like an army "tank" with a large plate in front used to push masses of earth, etc., in road-making and clearing.

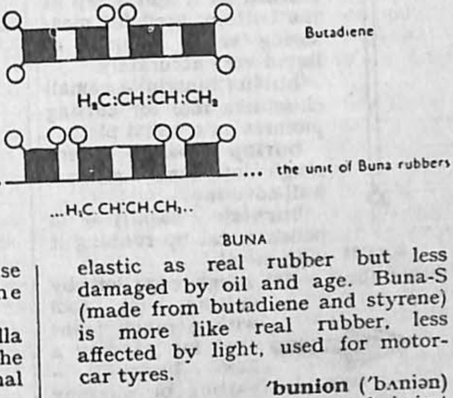
'bull-heads ('bul hedz) – bricks wider at one end than the other, used for arches.

'bull-nosed – having a square end one corner of which is rounded, e.g. **bull-nose brick. bullnose(d) plane** – wood smoothing tool so shaped and having the blade very near the front.



BULL NOSE PLANE

'Buna ('buunə) – artificial rubber made from ↓butadiene; not so elastic as real rubber but less damaged by oil and age. Buna-S (made from butadiene and styrene) is more like real rubber, less affected by light, used for motor-car tyres.



BUNA

'bunion ('bʌniən) – enlarged joint and inflamed ↓bursa on the big toe.

BUNION

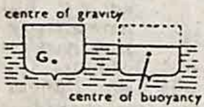
'bunker ('bʌŋkə) – coal-storage place. e.g. in a ship.

'Bunsen 'burner ('bʌnsən -) – gas burner (used in scientific laboratories) in which gas

BUNSEN BURNER

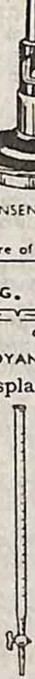
is mixed with air before burning.

bunt (bʌnt) – a fungus which turns wheat grain into powder.



BUOYANCY, CENTRE OF

'buoyancy, centre of ('bɔiənsi -) – point through which the upward push of water (e.g. on a ship) acts. In the diagram, *G* is the centre of gravity of the ship. The centre of buoyancy is the centre of gravity of the water displaced (pushed aside) by the ship.



BURETTE

bu'rette (bju'ret) – long open tube with measures marked on it and a tap at the bottom, used for measuring small volumes of liquid very accurately.

'burin ('bjuərin) – a small chisel-like tool for cutting pictures on a metal plate.

'burlap ('bəəlæp) – very rough cloth used, e.g., as a wall-covering.

'burnish ('bəəniʃ) – to polish metal by rubbing it with metal.

BURR

burr (bəə) – (1) rough edge left by cutting; (2) tool with a rough point used for grinding a hole. **burring** – cutting or scraping away a rough edge.

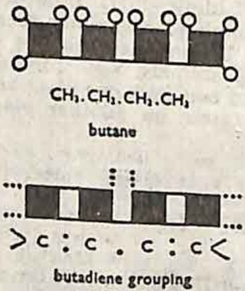
BURSA

'bursa ('bəəsə) – small bag inside the body containing liquid, especially where there is rubbing between skin or muscle and bone.

'bus-bar ('bʌs-baa) – bar used to join two or more electrical circuits.

bush (buʃ) – a tube put inside a pipe so as to act as a bearing for an axle, or in order to make the pipe smaller.

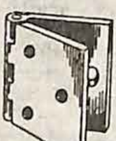
'buta'diene ('bjutə'dai.iin) – a colourless gas; it contains a chain of four carbon atoms arranged thus: C:C.C:C. See Buna.



BUTANE

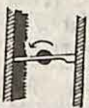
'butane ('bjuutein) – part of the gas which comes with petroleum from a petroleum well: the molecule consists of 4 carbon atoms with 10 hydrogen atoms. The normal arrangement is $CH_3 . CH_2 . CH_2 . CH_3$. It is used in motor-spirit, also, in steel containers, as a gas for burning in houses where there is no piped gas-supply (= Calor gas: trade name).

butt, butt-end – the square end of a square beam.



BUTT-HINGE

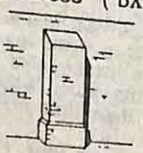
butt, butt-hinge – a hinge sunk into the edge of a door, or of a box, with its sides folding flat together.



BUTTERFLY VALVE

'butterfly valve – plate turning on an axle inside a pipe, e.g. for controlling the supply of petrol vapour to an engine: see also picture of carburettor.

'buttock ('bʌtək) – the part of the body on which you sit. **buttock line** – the curve of the underpart of a boat or ship drawn from end to end (not across). For picture see Lines.



BUTTRESS

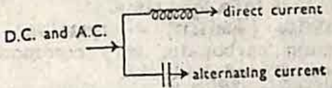
'buttress ('bʌtris) – support built against a wall to prevent it from curving or falling outwards. ↓ flying buttress.

'butyl group ('bjutil) – the group of atoms $CH_3.CH_2.CH_3CH_2–$ (↓ butane less one hydrogen atom). **butyl**

alcohol – $CH_3.CH_2.CH_2CH_2OH$, used to dissolve resin for making varnish.

bu'tyr-/ (bju'tir) – butter. **bu'tyric acid** – the acid formed in bad butter; $CH_3.CH_2.CH_2.COOH$.

'by-pass ('bai-paas) – instrument for sending a flow of (e.g.) gas round, instead of through, a part of a machine. **by-pass condenser** – a condenser used to give an easier path to alternating current and so separate it from direct current; or to give an easier path to high-frequency a.c. and so separate it from low-frequency a.c.



BY-PASS CONDENSER

by-pass jet engine – ↓jet engine in which a large part of the air which is sucked in does not go through the main engine but mixes with the hot gases at the back of the engine. If further fuel is added here it burns and gives greater power.

by-product – substance (formed in a process) other than the chief product, e.g. basic slag is a by-product in the making of steel.

byss-/ – having a mass of fine threads like cotton, e.g. **bys'saceous** (bi'seiʃiəs). **'byssoid. 'byssus** – the "beard" of a shell-fish (e.g. oyster or mussel), a group of thread-like outgrowths which help it to breathe and collect food by causing movement in the surrounding water.

C

C – (1) Centigrade thermometer scale; also (lately) named Celsius (Swedish, 1701–1744); (2) chemical sign for ↓carbon.

c – velocity of light

c.c. – cubic centimetre.

c.g.s. – ↓centimetre-gramme-second.

C.H.U. – Centigrade heat unit = pound calorie. ↓calorie.

C.R.T. – ↓cathode-ray tube.

Ca – chemical sign for ↓calcium.

cable (keibl) – (1) thick electric wire; (2) rope or chain, e.g. of the anchor; as measure of length about 600 feet.

'cabochon, en ɤ('kæboʃɔn, ɔn-) – (jewel) cut like half a ball.

'cabriole ('kæbrioul) – (leg of furniture) shaped like the back leg of a goat (capreolus).

CABRIOLE

cac-/ (kæk) – bad, e.g. ↓**cacodyl.**

ca'cao (kæ'keio) – the plant from which cocoa and chocolate are obtained.

'cachet ('kæʃe) – small *paper-container in which medicine is put for swallowing: *(paper made from flour).

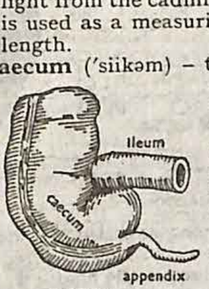
ca'chexia (kæ'keksiə) – state of weakness produced by a serious illness, e.g. by ↓cancer.

'cacodyl ('kækodil) – arsenic compound with an unpleasant smell, used to speed up the solidifying of rubber.

CACAO

'cadmium ('kædmiəm) – white metal-element used for electro-plating, also (in an alloy) to give a lower melting point; alloyed with copper to make electric wires. The red part of the light from the cadmium vapour lamp is used as a measuring unit of wave length.

'caecum ('siikəm) – the beginning of the large intestine (bowel) where the small intestine comes in to it. The appendix comes out from the side of the caecum.



CAECUM

cae'sarian section (siizeəriən) – taking out a baby from a mother by cutting open the body of the mother. (Julius Cæsar is said to have been born in this way.)

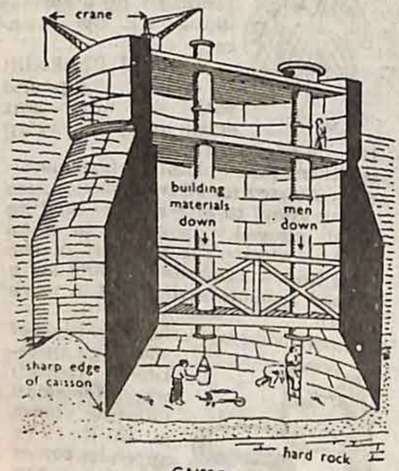
'caesium ('siiziəm) – alkali metal: light causes it to give out electrons, so it is used in photo-electric cells (e.g. as used in reproducing the sound for cinema films). **caesium 137** – a substance present in ↓fall-out; it can be taken up by living things in place of potassium. **caesium clock** – ↓atomic clock.

'caffeine ('kæfii.in) – white crystalline substance obtained from tea and coffee; it is the cause of their exciting action on the heart and nervous system.

'Caino'zoic era ('kaino'zouik) – ("new-living"): age, from about 55 million years ago to the present, when there was the development of life as it is now; e.g. mammals (breast-feeding animals) and birds first appeared.

'cairn'gorm ('keən'gɔɔm) – yellow-brown stone used for ornament.

cai'sson (kæ'suun) – water-tight box used in building under water.



CAISSON

caisson disease also called "Bends." – Under high air pressure, nitrogen becomes dissolved in the blood; when the pressure is lowered the nitrogen comes out in bubbles causing great pain and sometimes death.

'calamine ('kæləmain) – carbonate of zinc; used on the skin, e.g. for sunburn.

'calamus ('kæləməs) – the tube-like part of a feather.

cal'caneum (kæl'keiniəm) – os calcis = heel bone.

CALCANEUM

cal'car-/ (kæl'keə-) – made of lime, e.g. **cal'careous rocks.**

cal'ciferol (kæl'sifərɔl) – ("lime-carrier"): artificially prepared Vitamin D (lack of which causes soft bones especially in children).

'calcine ('kælsin) – burn bones to make calcium phosphate; heat a substance for a long time.

'calcite ('kælsait) – crystalline calcium carbonate, very common in many kinds of rocks.

'calcium ('kælsiəm) – white metal element common in the form of lime. **calcium 'carbide** ('kaabaid) – CaC_2, with water it makes ↓acetylene gas. **calcium carbonate** – $CaCO_3$, found in the form of chalk, limestone and marble. **calcium chloride** – $CaCl_2$, it absorbs water and is used for drying substances. **calcium oxide** – CaO, quicklime. **calcium hydroxide** – $Ca(OH)_2$, slaked lime as used by builders. **calcium sulphate** – $CaSO_4$, quickly solidifying plaster (plaster of Paris).

'calculus ('kælkjuləs) – a small stone formed in the kidney or bladder (organ in which urine collects), or in other parts, e.g. hands and feet in cases of ↓gout.

'calculus, 'infini'tesimal calculus – a way of making calculations about quantities which are continually changing, e.g. the speed of a falling stone, the volume of a gas as it is being compressed, the slope of a curved line, etc. There are two parts: Differential calculus, and Integral calculus.

(1) **'Diffe'rential calculus.** (What is the speed?)

Example – A mathematical statement says that the distance through which a thing has moved is (so-and-so) after (so many) seconds: what is the speed after an exact number of seconds? How can we find an exact speed at an *exact* moment if the speed is changing all the time? It is done by using in the calculations a bit of time which can be made as small as we like (infinitesimal).

Suppose we are told that the Distance (in feet) fallen by a stone which is dropped from rest is 16 × *T*ime² (in seconds): $D = 16.t^2$. What is the speed just after 3 seconds? Speed means distance ÷ time. Distance fallen in 3 seconds = 16×3^2. Now take 3 seconds plus a little *B*it of a second (drawing 1). Distance fallen in $3 + B$ seconds = $16 \times (3 + B)^2$. So distance fallen during this little bit of a second

= distance after $(3 + B)$ seconds *minus* distance after 3 seconds

$= 16(3 + B)^2 - 16 \times 3^2$

$= 16(3^2 + 6B + B^2) - 16 \times 3^2$

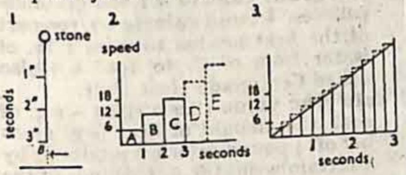
$= 16 \times 6B + 16B^2$

$= 96B + 16B^2$ feet.

The average speed (= distance ÷ time) during this little bit of a second

$$= \frac{\text{(distance)}}{\text{(time)}} = \frac{96B + 16B^2}{B} = 96 + 16B.$$

We can make *B* as small as we like. The smaller we make it the more exact the answer is (not average speed over a long *B* but exact speed in a flash of time); *and*, the smaller we make *B* the nearer 16*B* comes towards nothing. So the speed after 3 seconds is 96 + next-to-nothing = 96 feet per second. There are tricks or simple rules for making such calculations shorter – see below.



CALCULUS

(2) **'Integral 'calculus.** (What is the distance?)

Example – A mathematical statement says that a point on the edge of a wheel which is gaining speed has (so-much) speed after (so-many) seconds. How far has it moved after so-many seconds? Here the speed is always changing. We find the distance moved in each little bit of a second: (we can make this bit of a second as small as we like); and we add together the distances travelled in each bit.

Suppose we are told that the speed v of the point on a wheel is $6t$ (6 × time) inches per second after t seconds: $v = 6t$ inches. We know the speeds after 0, 1, 2, 3 . . . seconds: they are 0, 6, 12, 18 . . . inches per second. How far has the point moved after 5 seconds?

Suppose that the speed is steady through each second and jumps to a bigger value in the next second (*drawing* 2), for example, 6 during the whole of the 1st second, 12 during the whole of the 2nd second, etc. Distance during 1st second = 6 × 1 inches (shown by block *A*, drawing 2). Distance during 2nd second = 12 × 1 inches (shown by block *B*). Similarly for 3rd, 4th, 5th seconds. Total distance = 6 × 1 + 12 × 1 + . . (block *A* + *B* + *C* . . . *E* in the diagram).

But speed increases gradually, not in jumps. The blocks should not be flat-topped: they should be this shape . So, instead of taking whole seconds, take a large (uncountable) number of bits of time which can be made as small as we like. (*Drawing* 3.) The blocks are this shape . The smaller we make the bits of time, the thinner the blocks become, and the difference between flat-top blocks and blocks with sloping tops becomes less. The smaller the bits of time are, the nearer we get (by adding the blocks) to the real answer. Adding up all the distances in this way we get the answer 75 inches. This is done by a simple rule given below.

Simple rules of calculus. Thus there are two kinds of calculation –

A. Knowing the distance, what is the speed? – This is called **diffe'rentiating.** There is a set of rules for doing this, e.g. Distance = $16t^2$. Speed = $32t$. Thus, if $t = 3$, speed = 32 × 3 = 96 feet. The rule is "Multiply the number (16) by the power (2); then lower the power by 1." So if Distance = $16t^2$; Speed = $48t^2$; Distance = $3t^2$, Speed = $6t$, etc.

B. The rule for **integrating** (knowing speed, to find distance) is the exact opposite. For example, Speed = $32t$, Distance = $16t^2$. "Raise the power of t by 1 and divide the number (e.g. 32) by the raised power (2)." So also Speed = $6t$, Distance = $3t^2$. In the sum above ("What distance has the point on the wheel travelled, after 5 seconds?") the answer is $3t^2 = 3 \times 25 = 75$ inches.

There are other rules for other kinds of mathematical statements.

Calder-type reactor ('kɔldə-) – nuclear ↓reactor which uses natural uranium metal as the fuel, carbon dioxide gas for cooling, and graphite as the moderator (to slow down the neutrons). Named after the first type at Calder Hall.

'calender ('kælendə) – hot rollers pressing together; used for polishing paper.

'calibrate an instrument ('kælibreit) – put the scale marks on an instrument; to test a measuring instrument so as to see how much error must be expected in using it.

'calibre, -er ('kælibə) – inside diameter of a pipe, of the barrel of a gun (not including the depth of the spiral rifling).

'caliche ('kæliʃ) – sodium nitrate; also called Chile saltpetre.

'calico ('kælikou) – plain unbleached cotton cloth.

'callipers (cali-) ('kælipəz) – instrument for measuring the outside diameter of wires, bars, etc. or the inside diameter of pipes, etc.

CALLIPERS

'callouse, 'callous ('kæləs) – thickened skin due to rubbing.

'callus, ca'llosity ('kæləs, kæ'lɔsiti) – bony growth round the damaged part of a bone.

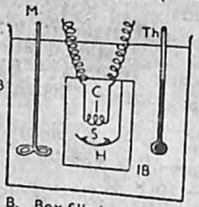
'calomel ('kæləmel) – mercurous chloride, Hg_2Cl_2, a medicine used (under doctor's orders) for the bowel and liver.

'Calor gas ('kælɔː -) – ↓butane in a steel container used for cooking, etc. where there is no town gas supply: (trade name).

'calorie ('kæləri) – unit for measuring heat. **Small calorie, gramme-calorie** – the amount of heat needed to raise one gramme of water from 15° C. to 16° C. **Large calorie, kilogram calorie** – 1,000 gramme-calories. **Pound calorie** – 1/100 part of the heat needed to raise 1 lb. of water from 0° C. to 100° C.: also called Centigrade Heat Unit.

'calo'rific value ('kælə'rifik) – e.g. of coal, the amount of heat (e.g. number of ↓pound-calories) produced by a certain weight (e.g. 1 pound) of the substance.

'calo'rimeter ('kælə'rimitə) – instrument for measuring an amount of heat, e.g. for measuring the amount of heat produced by burning some coal.



B. Box filled with water
IB. Inner box
H. Holder
S. Measured amount of substance burnt
C. Electrical coil to make S burn
M. Mixer to keep water mixed
Th. Thermometer

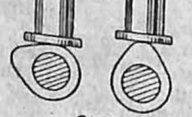
CALORIMETER

calx (kælks) – (1) the heel: picture ↓calcaneum; (2) powder (e.g. lime) produced by roasting a mineral (e.g. limestone); an ↓oxide produced by heating a metal in air.

ca'lypt-/ (kæ'lipt-) – hidden, covered, e.g. **ca'lypto'branchiate** (-'bræŋkieit) having the branchia (gills, breathing organs of fish) covered.

'calyx ('keiliks) – the outer group of leaves in which a flower is set (and which cover an unopened bud).

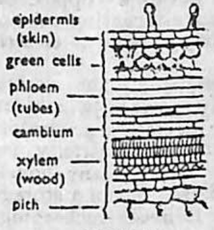
cam (kæm) – oval wheel, or part standing out from a wheel so as to cause a straight up-and-down (or in-and-out) movement.



CAM

'camber ('kæmbə) – the curve e.g. on a road from side to side so that water runs off.

'cambium ('kæmbiəm) – the growing layer in the stem of a plant.



CAMBIUM

'Cambrian (rocks) ('kæmbriən) – rocks about 520–420 million years old, containing remains of water - plants and the earliest known fossils of ↓ invertebrate animals.

'cambric ('keimbrik) – very fine linen material as used for handkerchiefs, about 100 threads to the inch.

'camel ('kæməl) – air-container used to raise sunken ships.

'cameo ('kæmiou) – small precious stone with its top layer (of a different colour from the under layer) cut into a design, e.g. a head.

CAMEO

'camera 'lucida ('kæmərə 'ljusidə) – sloping piece of glass so arranged that a thing is seen at the same time as the paper on which you are drawing it. **'camera obs'cura** (- əbskjurə) – a lens throwing pictures from outside onto a table inside a dark room.

'cames ('keimz) – long, H-shaped pieces of lead which hold the glass into leaded windows, e.g. stained glass windows in churches.

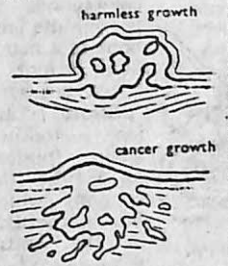
'campan-/ – bell, e.g. **'campa'nile** ('kæmpə'niili) – a bell tower which is not part of a church.

'Campbell 'Stokes – sunshine recorder ('kæmbl -'stouks) – a glass ball which causes sunlight to burn a mark on a curved piece of paper and so show hours of sunlight.

'Canada 'balsam ('kænədə 'bɔɔlsəm) – liquid from the ↓ balsam tree used to stick glass on to glass.

'cancellate ('kænseleit) – made up of cross-lines, made up of a net-work of tissue, e.g. the inside of a bone.

'cancer ('kænsə) – disorderly growth body-cells: (1) **'carci'noma** – cancer of the skin, surface-covering cells, bowel and parts formed from the outer layer of the developing ball of cells from which the child is formed; (2) **sar'coma** (saa'koumə) – cancer of bone, muscle-cells, and all parts formed from the inside layer in development. The difference between a cancer and a benign (= harmless) tumour is that the benign tumour pushes aside the surrounding tissue; a cancer grows into it and causes disordered growth in it.



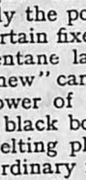
CANCER

'candela ('kændelə) – see candle-power. One candela = one "new" candle.

candle-power – unit measure of the intensity (strength) of a source of light. One candle-power was originally the power of a wax candle of a certain fixed size; special lamps (e.g. pentane lamps) are now used; the "new" candle is 1/60 of the radiating power of 1 square centimetre of a ↓ black body at the temperature of melting platinum. A 40-watt lamp (ordinary reading lamp) gives about 36 candle-power; a big electric bulb, 100 watt, as for room lighting, gives about 120 candle-power.

'canine ('kænain) – of dogs. **canine tooth** – pointed tooth on each side of the knife-like cutting teeth in the upper and lower jaws.

'canker ('kæŋkə) – infectious disease of trees; – of the ears of dogs, caused by a parasite.



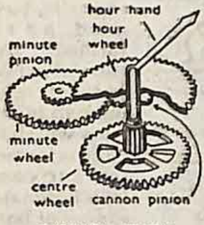
CANNON BONE

'cannabis – hemp, plant of the kind from which ropes are made. **'cannabis 'indica** – ↓ hashish.

'cannel coal ('kænəl-) – soft dull coal which burns with a bright flame and is used in gas-making.

'cannon-bone

('kænən-) – the long round bone in the lower part of a horse's leg; it corresponds to the middle long bone in a man's hand or foot.



CANNON PINION

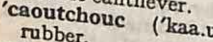
'cannon-'pinion (-'piniən) – toothed wheel (pinion) on a tube (the cannon) which fits on the axle of the centre wheel of a watch. This centre axle turns once an hour. The cannon pinion is geared to the minute wheel and this is geared on to the hour-wheel (which fits outside over the same (centre wheel) axle) The minute hand (not shown) is carried round by the cannon pinion.

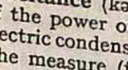
'cannula ('kænjulə) – (1) a tube through which an inner tube is guided, e.g. in drawing liquid out of the body: ↓ trocar; (2) any tube put into a tube of the body, e.g. into an artery, into the ureter (through which urine passes), etc.

can'tharides (kæn'θæridiiz) – Spanish flies, ½-inch insects from which a medicine is obtained, used to redden the skin.

'canthus ('kænthəs) – angle formed by the joining of the eyelids.

'cantilever ('kæntiliivə) – a beam fixed at one end and free at the other. A beam held up in the middle and free at both ends, as used in some bridges, is a double cantilever.


CANTILEVER BRIDGE


CANTILEVER CRANE

'caoutchouc ('kaa.uutʃu) – raw rubber.

ca'pacitance (kə'pæsitəns) – measure of the power of a **capacitor** (= an electric condenser) to hold electricity. The measure (farads) = amount of electricity (↓ coulombs) held ÷ the voltage between the plates. Capacitance depends on the distance between the plates, the substance (e.g. air, paper, plastic) between the plates and the area of the plates.

ca'pacitative re'actance – opposition to the flow of an alternating current caused by a **capacitor** (= electric condenser).

ca'pacity (kə'pæsiti) (1) the electric power (so many ↓ watts)which can be produced by an electric generator; (2) the amount of electricity (so many amperes for so many hours) which can be passed out of a storage battery before it needs recharging; (3) (wrong use) = capacitance. **thermal capacity** – the amount of heat needed to raise a thing (e.g. a block of metal, the water in a container) through one degree.

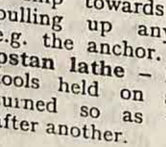
ca'pill-/ (kə'pil-) – hair, **ca'pillaries** – very small (hair-like) blood vessels. **capillary tube** – hair-like tube. **ca'pillary a'ttraction** – Water is drawn up into a very small tube by the attraction between the molecules, so also in blotting paper and the wick in an oil-lamp.

'capit-/ (kæpit-) – head. **'capital** (kæpitəl) (building) – the top part of a pillar. **ca'pitulum** (kæ'pitjuləm) – head of a daisy-like flower which opens from the outside inwards towards the centre; the enlarged rounded head of a bone.

cap jewel – jewel put over the top of an axle in a watch.

capr-/ (kæpr-) – goat, e.g. **'Capricorn** ('kæpri'kɔɔn) – the goat, the tenth division of the Zodiac. **'capriform** – shaped like a goat.

'capsicum ('kæpsikəm) – chilli (red, very hot seed-container, used in food); when powdered = red pepper.


CAPSTAN

'capstan ('kæpstən) – upright drum in a ship turned to wind up a rope, e.g. in pulling a ship towards the land or in pulling up any heavy weight, e.g. the anchor.

capstan lathe – lathe with several tools held on a drum which is turned so as to use one tool after another.

'capsule ('kæpsjuul) – (1) small box, e.g. for holding an amount of medicine to put into the mouth; small enclosed space, e.g. in the brain; (2) the spore-container of a moss; (3) dry seed-case of certain plants (e.g. poppy).

CAPSULE

'carapace ('kærəpeis) – horny outer shell of a creature such as a tortoise.

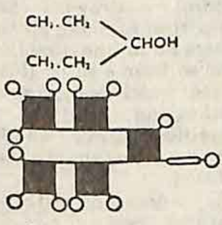
CARAPACE

'carat, 'karat ('kærət) – (1) unit for measuring the weight of gold and jewels, 1/5 gramme; (2) unit of measure of the pureness of gold: 24 carat = pure gold.

'carbamide ('kaabəmaid) = ↓ urea.

'carbide ('kaabaid) – compound of carbon and a metal, e.g. ↓ **calcium carbide,** CaC_2.

'carbinol – name given to methyl alcohol (CH_3OH) as a starting-point for naming alcohols: Example : if two ethyl groups ($CH_3.CH_2$–) take the place of two H atoms, the alcohol can be called di-ethyl-carbinol. ↓ secondary alcohols.



$$\begin{matrix} CH_3.CH_2 \searrow \\ \quad\quad CHOH \\ CH_3.CH_2 \nearrow \end{matrix}$$

di-ethyl-carbinol

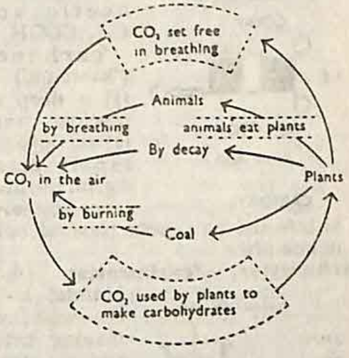
CARBINOL

'carbo'hydrates ('kaabo'haidreits) – group of chemical compounds which includes glucose, sugar, starch and cellulose (wood fibre). They are made up of carbon, hydrogen and oxygen atoms, mostly arranged in HCOH groups (↓ glucose, cellulose). The carbohydrates which we eat supply heat and energy to the body: for diagram, see glucose.

car'bolic 'acid ('kaa'bɔlik) = ↓ phenol; the name is commonly used for phenol dissolved in water, making the strong-smelling liquid commonly used in bathrooms and lavatories.

'carbon ('kaabən) – the chemical element in coal, charcoal, graphite (e.g. pencil lead), diamonds. **'carbon di'oxide** – CO_2, produced by the body and breathed out with the unused waste air; CO_2 is also produced when carbon is burnt in air. **'carbon mon'oxide** – CO, produced when carbon is burnt in a small quantity of air: found in the poisonous gas which comes out of a slow-running motor car; also after explosions in coal-mines. **'carbon 'tetra'chloride** ('tetrə'klɔɔraid) – CCl_4, used in instruments for putting out fires; also for cleaning fat and oil from cloth.

carbon cycle – (1) the movement of carbon compounds from the bodies of plants and animals into the air and back again. (2) (atomic) – a possible way in which four protons (hydrogen nuclei) are built up into one helium nucleus with the production of much energy, as in large stars. The cycle (series of changes) begins with the joining of a proton with a carbon atom to form an ↓ isotope of nitrogen. The addition of further protons causes further changes and, in the end, a helium nucleus is made and an ordinary carbon atom remade.



CARBON CYCLE

car'bonic acid (kaa'bɔnik-) – H_2CO_3, carbon dioxide dissolved in water, e.g. in soda-water. The salts of carbonic acid are **carbonates.**

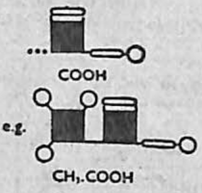
'carbo'niferous rocks ('kaabə'nifərəs-) – system of rocks including coal-bearing rocks laid down about 270 million years ago.

'carbonize ('kaabənaiz) – (1) heat without air so as to form carbon, e.g. make wood into charcoal; (2) ↓ carburize.

'carbonyl group ('kaabənil) – the group of atoms CO. Example: a compound of carbon monoxide and nickel is called nickel carbonyl.

'Carbo'rundum ('kaabə'rʌndəm) – trade name for silicon carbide, SiC; hard dark grey substance used for sharpening tools; made by heating together sand, coke, wood-powder and salt to about 2,000° C.

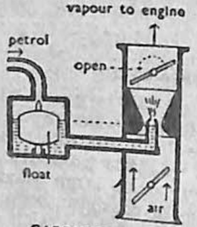
car'boxyl group (kaa'bɔksil) – the acid-forming group of atoms, –COOH, as in acetic acid $CH_3.COOH$.



CARBOXYL

'carbuncle ('kaabʌŋkl) – (1) a deep red precious stone; (2) an inflamed septic mass, e.g. on the neck, caused by several infected hair-roots (several boils) in one place.

carburettor, 'carburetter ('kaabiuretə) – instrument for making petrol and air into a mixture which will explode in the cylinder of an engine.



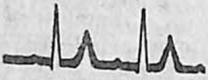
CARBURETTOR

'carburize ('kaabiuraiz) – cause the surface-layer of steel to be combined with carbon, e.g. by heating the steel in a box with carbon (charcoal) packed round it (= case hardening).

car'cinogen (kaa'sinədʒen) – a substance which causes cancer, e.g. **'dibenzo'pyrene** which is found in coal tar.

'carci'noma ('kaasi'noumə) – ↓ cancer (disorderly growth) in those parts of the body (the skin, bowel, surface covering cells, etc.) formed from the outer layer of the fertilized ovum (egg cell).

cardi-/ – heart; e.g. ↓ **'cardiac** ('kaadiæk) – having to do with the heart. **'cardiagram** ('kaadiəgræm) – drawing of the heart-beats made by an instrument on paper.

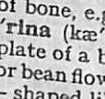


CARDIAGRAM

'Cardiazol ('kaadiəzɔl) – drug made from camphor; it has a stimulating (exciting) effect on the centres of the brain and spinal cord which control breathing and on the heart and blood-vessels; used in cases of poisoning by sleep-producing substances; also in the treatment of mental disorder: (trade name).

'cardinal ('kaadinəl) – (*cardo* = hinge): most important, e.g. **cardinal points** of the compass – the four main points of the compass, N., S., E., W.

'carding ('kaadiŋ) – drawing fine teeth through cotton to make all the fibres lie in one direction and so form a sliver (long piece which when spun makes one thread).



CARDIOID CURVE

'cardioid curve ('kaadiɔid -) – curve shaped like a heart.

'caries ('keəri.iiz) – decay of teeth, or of bone, e.g. of the spine.

ca'rina (kæ'riinə) – the keel (bottom plate of a boat); such a part of a pea or bean flower. **'carinate** ('kæri'neit) – shaped like the bottom of a boat.

'carlines, 'carlings ('kaaliŋz) – short beams running long-ways between the cross-beams of a ship, and helping to hold up the deck.

'carminative (medicine) ('kaaminətiv) – which cures wind and discomfort in the stomach, e.g. bicarbonate of soda, bitters, etc.

'carnallite ('kaanəlait) – potassium and magnesium salts obtained from dried up salt lakes; used for fertilizer; important source of potash.

car'nelian (kaa'niiliən), **cornelian** – clouded brick-red precious stone.

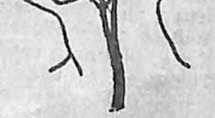
car'nivora (kaa'nivərə) – meat-eating animals, e.g. lion, tiger.

'Carnot's Cycle – the series of changes in Carnot's engine (see below).

Carnot's principle ('kaanoz-) – A heat-engine (e.g. a steam-engine) takes in heat from something which is hot, changes some of the heat into useful work, and gives out some of the heat to something which is cold. To answer the question "How much work do we get?" Carnot imagined an engine (**Carnot's engine**) in which a gas takes in heat *only* from the hot thing, gives out heat *only* to the cold thing (with no losses), and finishes exactly as it started. Every step must be reversible (able to be made to go backwards as well as forwards). Thus there must be no friction, for the change of work into heat by friction cannot be worked backwards. Carnot was able to prove that no real engine can change more heat into work than this engine, and that the amount of heat changed into work by this engine depends only on the hot and cold temperatures. Although Carnot's perfect engine cannot be made, his results are useful in the study of the working of real engines. ↓ entropy.

'carotenes ('kærətiinz) – red crystalline substances found in carrots and in butter; they are important substances in the colouring of leaves; ↓ Vitamin A is formed from a carotene.

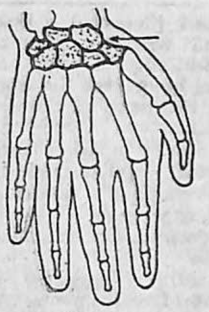
ca'rotid artery (kæ'rɔtid) – vessel which carries blood to the head.



CAROTID ARTERY

/-carp (-kaap) – fruit, seed, e.g. **'pericarp** – part of plant round the seed, the fruit-wall.

'carpal ('kaapəl) – having to do with the **carpus** (wrist), e.g. **'meta'carpal** – (bones) beyond the wrist.

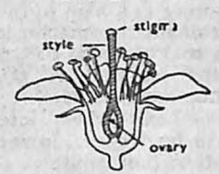


CARPAL

'carpels ('kaapəlz) – the parts of a flower which form the ovary containing unfertilized seeds (ovules).

'carra'geen ('kærə'giin) – Irish moss which, with water, makes a white jelly used for food.

carrier of disease – person not suffering from a disease (e.g. diphtheria, typhoid) yet able to infect other people with it.



CARPEL

carrier wave – continuous waves of electricity sent out by a radio station; the electrical waves which carry the sounds are imposed (put) onto it. For diagram ↓ modulate.

'carrion ('kæriən) – flesh of dead animals, e.g. **carrion crow** – a bird which eats carrion. **carrion flower** – flower which smells like carrion and eats flies.

Car'tesian – ↓ co-ordinates.

'cartilage ('kaatilidʒ) – strong, elastic bone-material without lime in it; the "gristle" of meat; in a young animal there is much cartilage which later becomes bone.

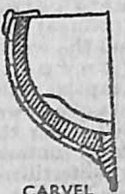
carto-/ – map, e.g. **car'tographer** (kaa'tɔgrəfə) – map-drawer.

'car'touche ('kaa'tuuʃ) – carved stone made to look like partly unrolled paper.

'cartridge paper – strong, hard, drawing-paper.

'caruncle ('kærʌŋkl) – (*caro* = flesh): small soft outgrowth on the body. **ca'runculus** (kə'rʌŋkiuləs) – small red spot at the inside corner of the eye.

'carvel-built boat ('kaavəl-) – boat built with the pieces of wood edge to edge, not one lying over the edge of the next. ↓ clinker-built.


CARVEL

'cary'atid ('kæri-'ætid) – pillar made in the shape of a woman.

'cary'opsis ('kæri-'ɔpsis) – a dry fruit such as a wheat grain.

cas'cade (kæs'keid) – ("waterfall"): an arrangement of instruments, *A, B, C* . . . which repeat the same process, each acting as a help to the next, e.g. a set of freezing-machines each using the cold material of the instrument before, so that, in the end, great cooling is produced.

case (printer's) – box divided into small squares to hold type. **lower case** – small letters (not capitals).

'case-hardening – heating iron in carbon, then putting it in cold water so as to harden the surface.

'casein ('keisii.in) – the protein of milk; cheese is mainly casein. **casein plastic** – plastic made from casein and formalin: its special usefulness is that it is cheap, and it is easy to produce pretty colours and shapes in it; but it does not resist water; used for buttons, fountain-pens and other ornamental things.

'casement ('keismənt) – window which opens on hinges (like a door), not by pushing up and down. **casement cloth** – plain cotton cloth, dyed or printed; used for curtains.

'cashew nut ('kæʃuu -) – S. American nut, kidney-shaped; cooked for eating; used to make rubber-like covering for electric wires, etc.

CASHEW NUT

'cash'mere cloth ('kæʃ'miə -) – (1) fine cloth woven in Kashmir from Tibetan wool; (2) machine-made cloth of silk and wool crossed.

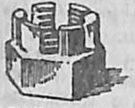
cas'siterite (kæ'sitərait) – tin oxide, an important tin ore.

cast (metal) (kaast -) – to melt (metal) and pour it into a mould. **a cast** – the shape of a thing left, e.g. in clay; the outer surface of a small tube, e.g. of the kidney passed out from the body. **casting** – a thing cast in metal, e.g. wheel, axle, etc. **'cast-'iron** – an easily broken form of iron, containing some carbon and other impurities. It can be used for making castings but cannot be shaped by hammering and pressing.

cast 'off – to calculate the number of printed pages which will be filled by a written or type-written book.

CASTOR

'caster, castor ('kaastə) – wheel under the leg of a chair (etc.) so fixed on a pin that it can turn in any direction.


CASTLE NUT

'castle nut – nut with grooves cut in the top so that a pin can be put through the bolt.

cat-/ – having to do with the anchor of a ship, e.g. **cat-head** – beam standing out at right angles to the bow (front) of a ship from which the anchor is raised or lowered. **cat holes** – holes at the back of a ship through which ropes go for pulling the ship backwards.

cata-/ – Also see kata-/.

'catalepsy ('kætəlepsi) – illness in which there is loss of sensation and will-power and a stiffening of the muscles: in some cases there is a state which might be mistaken for death: the cause is usually emotional, but may in some cases be connected with ↓ epilepsy.

'catalyst ('kætəlist) – substance which causes or hastens a chemical change in other substances without being changed itself; e.g. platinum causes hydrogen and oxygen to combine (and so is used to light gas fires). Yeast changes sugar into alcohol by **'cata'lytic** action. Most of the chemical processes of the animal body and of plants are carried out by catalysts (↓ enzymes); also many of those of chemical works, e.g. ↓ cracking of petroleum.

'catama'ran ('kætəmə'ræn) – a boat with two hulls.

'catapho'resis ('kætəfɔ'riisis) – electrically-caused movement of particles in a ↓colloid towards the cathode (negative electric plate). ↓/-phoresis.

'cataplexy ('kætə'pleksi) – illness in which a person suddenly falls down unable to move or speak, but without loss of consciousness. See also **kataplexy.**

'cataract ('kætərækt) – loss of clearness in the lens of the eye, usually due to old age.

ca'tarrh (kə'taa) – "cold" in the head; also used of an inflamed condition of the stomach and bowel.

'cata'tonia ('kætə'tɔniə) – mental illness in which the person remains in a fixed position and will not move or talk.

catch crop – a quick-growing crop sown after the spring crop and before the autumn (or at other times) so that the land may not lie idle; e.g. lettuce, radishes, spinach, in the garden.

'catchment area – area of land from which a river gets its water.

catch pit – hole at the entrance to a drain to catch solid matter which might stop up the drain.

catch points – side pieces fitted to a railway line on a hill which derail (turn off the line) any railway carriage or truck which runs backwards down the hill.

'catechu ('kætikiu) – substance extracted from various plants (e.g. *Uncaria Gambier*), used for dyeing, leather-making and to stop looseness of the bowels. Also called **cutch.**

caten-/ – chain, e.g. **ca'tenary curve** – the curve in which a loose chain (*catena*) hangs when held up at its ends.

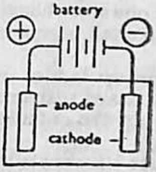
ca'thartic (kə'θaatik) – (drug) which causes emptying of the bowel.

ca'tharsis – telling freely some hidden emotion so as to get peace of mind.

'catheter ('kæθitə) – a tube passed into the body, e.g. so as to draw out the urine.

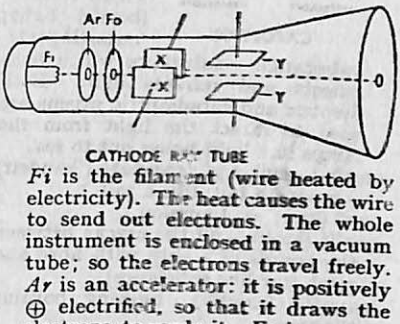
'cathe'tometer ('kæθi'tɔmitə) – small telescope moving on a scale used to get exact measures of height, e.g. of mercury in a barometer.

'cathode ('kæθoud) – negative electrical plate, e.g. in electrolysis. Negative ions (⊖ electrified particles) flow away from the cathode through the liquid. In an X-ray tube or radio valve, electrons pass out from the cathode through the gas (or vacuum) to the anode (the positive plate).



CATHODE

cathode rays – streams of electrons coming from the cathode in a **cathode ray tube.** See diagram.



CATHODE RAY TUBE

Fi is the filament (wire heated by electricity). The heat causes the wire to send out electrons. The whole instrument is enclosed in a vacuum tube; so the electrons travel freely. *Ar* is an accelerator: it is positively ⊕ electrified, so that it draws the electrons towards it. *Fo* is a negatively ⊖ charged ring; it pushes the electrons together and so acts as a lens and *focusses* (brings to a point) the beam of electrons (*Fi, Ar, Fo* form an *electron gun*). The beam falls on a layer of *fluorescent material on the flattened end of the tube: *(material which gives out light when the electrons fall on it). *XX* and *YY* are deflecting plates or coils (bending away plates). They are made electrically ⊕ and ⊖ and make the beam move across (*XX*), or up and down (*YY*). ↓Emitron, Iconoscope, radar, television.

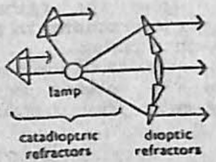
ca'thodic protection (kæ'θoudik -) – way of protecting metal (e.g. steel) against corrosion (rust) by passing a small electric current between the metal surface and the surrounding ground or water.

'cation ('kætaiən) – a positive ion which moves to the ↓cathode. ↓anion.

'catkins ('kætkinz) – groups of very small flowers all on one stem hanging down like an animal's tail from a tree (e.g. oak, poplar).

cat-ladder – straight-up ladder, e.g. into a roof; sloping board with cross-pieces for walking up the outside of a sloping roof.

ca'toptric substance (kæ'tɔptrik) – substance which reflects light, e.g. a mirror. **di'optric substance** (dai'ɔptrik) – substance which refracts (bends) light; **'catadioptric substance** – substance which both reflects and refracts light. Both dioptric and catadioptric prisms are used to direct the light from the lamps in a light-house out to sea.



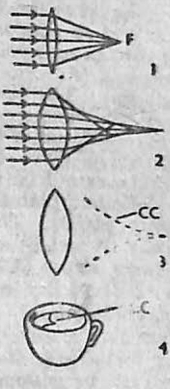
CATOPTRIC

caud-/ – tail, e.g. **'caudate** ('kaudeit) – having a tail; like a tail.

caul (kɔɔl) = ↓amnion.

caulk (kɔɔk) – fill the cracks between the boards of a ship with fibre and pitch (tar-like substance).

'caustic ('kɔɔstik) – burning; burning the skin.



CAUSTIC CURVE

caustic curve – A thin lens with a slight curve brings light to a point (focus) as in (1). A very thick or sharply curved lens does not bring the light to a point (2). Instead of a bright point *F*, there is a bright surface (3). This curved surface is the caustic curve (also called **caustic surface**). So also in the case of mirrors and curved reflecting surfaces. The caustic curve can be seen on the surface of tea in a cup standing in a bright light (4).

'caustic 'potash ('kɔɔstik 'pɔtæʃ) – potassium hydroxide (KOH). **caustic soda** – sodium hydroxide (NaOH), used for cleaning greasy things, also for softening paint.

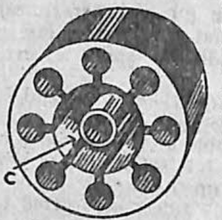
'cautery ('kɔɔtəri) – instrument with a red-hot point used for burning away small growths on the skin.

'cavings ('keiviŋz) – short pieces of straw thrown out from the machine in threshing (separating grain from cut wheat, etc.).

'cavi'tation ('kævi'teiʃən) – making a cavity, e.g. when the propellers of a ship turn very fast an empty space forms behind them; this wastes power and wears the propellers.

'cavity ('kæviti) – hole, hollow, e.g. hollow place in the body.

'cavity 'magnetron – First see magnetron. The cavity magnetron consists of a block of copper with 8 holes in it, as shown; each hole is joined by a slot to the larger central hole. *C* is the cathode ⊖, the block is the anode ⊕. The holes and slots form ↓oscillatory circuits so that the whole valve acts as an oscillator. (The holes form ↓cavity resonators: see below.)

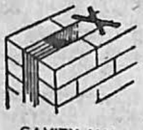


CAVITY MAGNETRON

'cavity radi'ation – ↓black body.

'cavity 'resonator (- 'resɔneitə) – First see oscillatory circuit. Electric oscillations can be set up in an oscillatory circuit containing a coil and a condenser, in an aerial (which acts like a coil and a condenser), or in the walls of an enclosed box. A box so used is a cavity resonator. ↓cavity magnetron, ↓klystron.

'cavity wall – double wall with a space between.



CAVITY WALL

Cd – chemical sign for ↓ cadmium.

Ce – chemical sign for ↓ cerium.

'ceiling, 'absolute ceiling ('siiliŋ -) – the greatest height to which a certain aeroplane can fly.

/-cele – a swelling out, e.g. **'enterocele** ('entərosiil) – swelling out of a piece of bowel through a hole between the muscles. **'cephalocele** – swelling out of the brain-covering through a hole in the skull. ↓ hydrocele, varicocele.

ce'lestial 'sphere (si'lestiəl 'sfiə) – the sky thought of as the inside of a ball on which the stars are fixed. **celestial e'quator** – the imaginary line round the celestial sphere, just as the equator of the Earth is a line round the middle of the Earth. (For diagram, see declination.)

ce'lestine (si'lestiin) – strontium sulphate, $SrSO_4$, an ore of ↓ strontium.

cell (sel) – (1) a unit from which living matter is built up, consisting of protoplasm and (usually) a nucleus. (2) a container of chemicals for producing electricity, e.g. a ↓ Leclanché cell. (3) a unit of a crystal ↓ lattice.

'Cellophane ('seləfein) – very thin, paper-like, transparent plastic used for packing: (trade name).

'cellular ('seliulə) – made up of cells.

'cellular 'tissue – mass of fibres as "packing" between the skin and muscles and round organs: ↓ fibrous tissue.

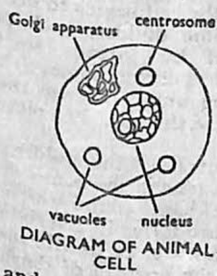
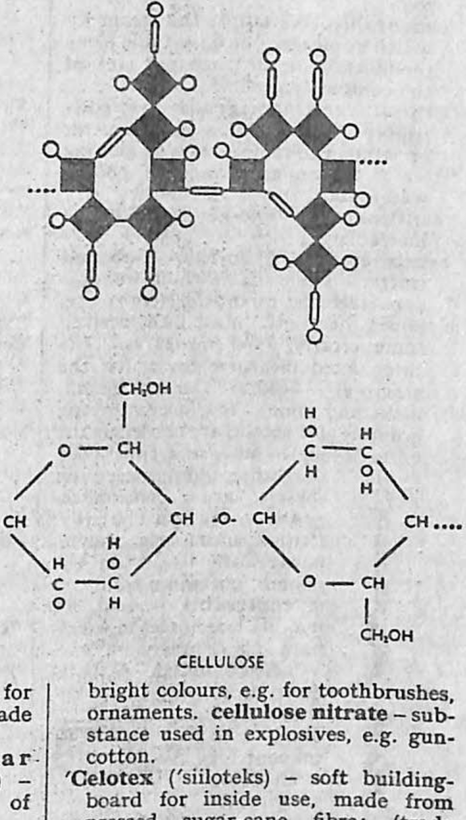


DIAGRAM OF ANIMAL CELL

cellulitis ('seliu'laitis) – inflammation in this tissue.

'celluloid ('seliulɔid) – the clear substance of photographic films.

'cellulose ('seliulous) – wood fibre; chemically a long chain of ↓ glucose molecules joined together. **cellulose acetate** – plastic substance, made from cellulose and acetic acid; used for films, fibres, etc.; also made in bright colours, e.g. for toothbrushes, ornaments. **cellulose nitrate** – substance used in explosives, e.g. gun-cotton.



CELLULOSE

'Celotex ('siiloteks) – soft building-board for inside use, made from pressed sugar-cane fibre: (trade name).

'Celsius ('selsiəs) – name for the centigrade thermometer scale. ↓ C.

ce'ment (si'ment) – (1) grey powder which, mixed with sand and water, is used for building: (2) any substance which is used in a soft or liquid form but becomes hard later, e.g. cement for filling holes in teeth.

'cemen'tation ('siimen'teiʃən) – (1) sticking together as with cement; (2) (of steel) = ↓ case-hardening.

ce'mentite (si'mentait) – the iron

carbide (Fe_3C) in cast iron and steel; it is very hard but easily broken.

'Ceno'zoic ('siino'zouik) = ↓ Cainozoic.

'censorship ('sensəʃip) – the means by which unpleasant or unsuitable ideas (memories, desires) are put out of the conscious mind.

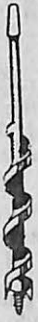
'centi-/ – 100. **centigrade ther'mometer** ('sentigreid) – thermometer on which the temperature of melting ice is shown as 0° and of boiling water, 100°.

'centimetre – one-hundredth of a metre; 0·394 inch.

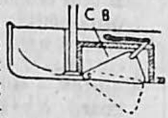
centimetre - gramme - second units. – The units in which we measure scientific quantities (e.g. force, power, heat, etc.) must be related to some clearly fixed measures. The three fixed measures on which the others are based are those of length, mass and time. If the centimetre, gramme and second are chosen as the units of length, mass and time, then the other units (based on these) are centimetre-gramme-second units. British units, e.g. horse-power, are based on the pound foot and second.

'centre-bit – tool for making large holes in wood; used in a ↓ brace.

'centre board – plate let down from the bottom of a boat to prevent it from being blown sideways.



CENTRE-BIT



CENTRE BOARD

centre of buoyancy – ↓ buoyancy.

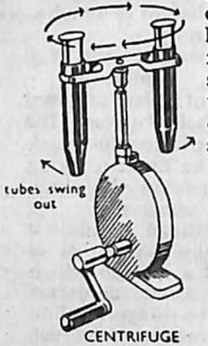
centre of gravity – the point in anything on which it would balance.

'centre punch – pointed tool with which a small hollow is made, e.g. where a hole is to be drilled.

cen'trifugal force (sen'trifiugəl) – force pulling away from the centre in a system which is being spun or swung round. Example: if you spin round a bucket of water, the water presses on the inside of the bucket; the train going round a corner presses against the outside rail.

'centri'fuge ('sentri'fjuudʒ) – instrument in which a container full of liquid is spun round at high speed so that the heavier part of the liquid or any solids may be carried to the bottom by centrifugal force.

'centriole – a grain in the middle of a ↓ centrosome of an animal cell; it is the first part to divide when the cell divides.



CENTRIFUGE

cen'tripetal force (sen'tripitəl -) – the force needed to make a thing move in a circle, e.g. the pull of the string when a stone tied to its end is spun round in a circle. If the force stops (e.g. the string breaks) the thing flies off in a straight line. The centripetal force is equal to the centrifugal force.

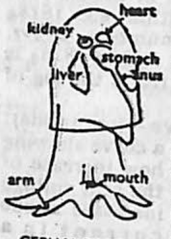
'centroid ('sentrɔid) – ↓ centre of gravity, or, in a curve or figure, the point which *would be* the centre of gravity if the thing were a solid.

'centro'some ('sentro'soum) – a small Body near the nucleus of a cell; it controls the division of the cell into two. When the cell begins to divide, the centrosome divides, each part being joined by threads to the nucleus; the ↓ chromosomes (character-carrying units) arrange themselves on these threads. For picture, see cell.

'centrum ('sentrəm) – the middle part of a vertebra (one of the bones which form the backbone) round which the other parts are formed. ↓ vertebra.

cephal-/ – head, e.g. **ce'phalic index** (se'fælik) – the breadth of the head as a percentage of the length. If the breadth is 80% of the length, the skull is **'brachyce'phalic** ('bræki-) – short-headed; below 75% it is **'dolichoce'phalic** ('dɔliko-) – long-headed. *Note.* – Medical people often pronounce this root as kefəl, e.g. ↓ **encepha'litis** (enkefə'laitis).

'Cephalopoda ('sefəlopoudə) – ("head-feet") – class of sea creatures (e.g. octopus) in which the mouth is in the middle of the foot.



CEPHALOPOD

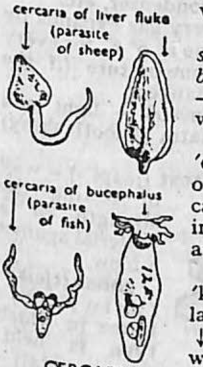
'Cepheid 'variables ('sefii.id 'veəriəblz) – Variable stars change regularly in brightness. Cepheid variables change in brightness in a certain known way, each series of changes taking about a week. They are of importance in measuring the distances of stars.

/-ceptor (-'septə) – receiver of sensations, e.g. **'extero'ceptor** – sensory nerve-ending which receives messages from outside the animal, e.g. of sight (not, e.g., a pain nerve inside the body, which is an **'inter'ceptor**).

'cer-/, 'ceri-/ – wax; e.g. **'cerate** ('siəreit) – medical preparation made with wax.

ce'ramic (*museum* ke'ræmik – *but trade* se'ræmik) – having to do with pottery.

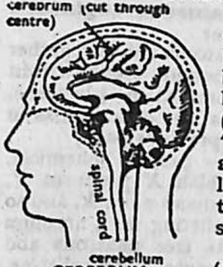
cerc-/ – tail, e.g. **'cercal** ('səəkəl) – of the tail; the cercariae (below) are in the larval stage and have tails.


cercaria of liver fluke (parasite of sheep)
cercaria of bucephalus (parasite of fish)

CERCARIA

cer'caria (səə-'keəriə) – the last larva-stage of a ↓trematode worm (e.g. the liver fluke causing disease of sheep). Stage 1. – inside sheep 2. – worms pass out on to grass and become **'mira'cidia** ('mairə'sidiə); 3. – miracidia enter a snail and become **'redia** ('riidiə); 4. – redia become cercaria, leave the snail and are eaten by sheep. Similarly in the organism which causes ↓ bilharzia.

cereb-/ – brain. **'cere'bellum** ('seri'beləm) – the smaller brain (at the back); **'cerebrum** ('seribrəm) – the larger (main) brain.



CEREBRUM

'cerebro-spinal fluid – the liquid around the brain and inside the spine.

'cerium ('siəriəm) – metal element, alloyed with iron to make the "flints" of cigarette-lighters.

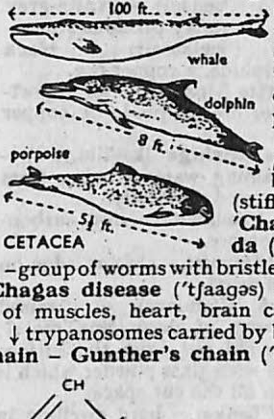
ce'rumen (se'riūmen) – a waxy substance secreted (separated out) by an animal, e.g. wax in the ear.

'cervix ('səəviks) – neck; narrow part, e.g. of a tube; adj. **cervical** (- vikl; but medical – vaikl).

'Cervidae – the deer family.

'Cestoda ('sestodə) – tape-worms (long worms which live in the bowel).

Ce'tacea (sii'teisiə) – the group of sea-creatures which includes whales, dolphins, porpoises.

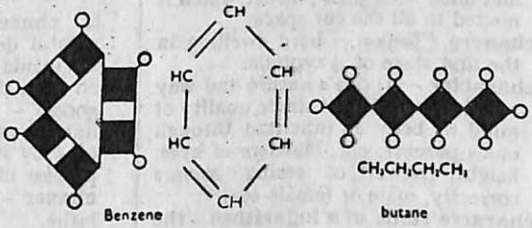

100 ft.
whale
dolphin
8 ft.
porpoise
5½ ft.

CETACEA

chaet-/- (kiit-) – bristle (stiff hair) e.g. **'Chaeto'poda** (-o'poudə) – group of worms with bristle-like legs.

'Chagas disease ('tʃaagəs) – disease of muscles, heart, brain caused by ↓ trypanosomes carried by bed-bugs.

chain – Gunther's chain ('gʌntəz -)



Benzene

CLOSED CHAIN

butane

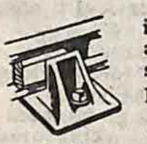
OPEN CHAIN

CHAIN

= 66 feet. **Ramsden engineer's chain** = 100 feet.

chain – a row of atoms joined together to make a compound. **closed chain** – a ring of atoms as in ↓benzene. **open chain** – a line of atoms as in ↓butane. (see previous page)

chain reaction – process (chemical, physical) in which *X* produces *Y*, and then *Y* produces more *X*, and so on; e.g. the splitting of ↓uranium 235 atoms sets free neutrons and these in turn cause more splitting, and so on. If each *X* gives rise (on the average) to one more *X*, the process is self-sustaining (keeps itself going); if it produces more than one other *X*, the process is explosive (as in a uranium bomb).



CHAIR

chair – U-shaped iron piece which holds a railway line on to the sleeper (wooden cross piece).

chal'cedony (kæl'sedəni) – white-grey milky precious stone.

'chalcocite ('kælkəsait) – black copper sulphide, a copper ore.

'chalco'pyrite (-'pairait) – an important copper ore (sulphide of copper and iron).

cha'lybeate springs (kæ'libi.it -) – iron-containing water coming from the earth, used medically.

'chalybite ('kælibait) – iron carbonate, an iron ore.

'chamfer ('tʃæmfə) – sloping edge on a piece of wood.

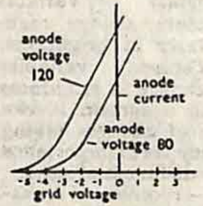
'champlevé ('ʃɔmleve) – ("raised field"): way of decorating metal; areas are cut out from the surface and filled with glass powder which is melted to fill the cut space.

'chancre ('ʃæŋkə) – hard swelling in the first stage of ↓syphilis.

'character – (1) one's nature and way of behaving; (2) one single quality of mind or body as inherited through one's parents, e.g. blueness of eyes, height, power of seeing colours correctly, male or female sex.

'characte'ristic of a logarithm – the number before the decimal point in a logarithm, e.g. 1 in 1·18184, etc. The characteristic shows where the decimal point comes in the number shown by the logarithm, e.g. 18184 is the log of the numbers 1–5–2. 0·18184 is the log of 1·52; 1·18184 is the log of 15·2; 2·18184 is the log of 152.

'characte'ristic 'curve – (see triode): a curve showing how increase of the grid voltage increases anode current in a radio valve; also called ↓ **mutual characteristic.**



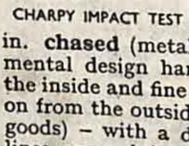
CHARACTERISTIC

charge – to put into a thing the right amount of substance, e.g. fill (a gun) with (gunpowder); the substance put in = **the charge. charge with electricity** - put electricity into a storage battery (etc.): the amount of electricity put in. So also in a condenser, etc.

Charles' law – Every gas expands by 1/273 of its volume at 0° C. for every degree rise in temperature (if the pressure is not changed).

char'meuse (ʃaa'məəz) – light silk material with a satin (smooth shiny) surface.

'Charpy 'impact test (ʃaapi -) – way of testing the strength of a material against a blow.



CHARPY IMPACT TEST

chase (tʃeis) – (printing): frame in which type is held: (stone, metal) – to cut grooves in. **chased** (metal) – with an ornamental design hammered out from the inside and fine surface marks put on from the outside; (machine-made goods) – with a design, e.g. of fine lines pressed into the silver (gold, etc.) by steel rollers. **chasing** – the process of cutting screws in a lathe. **chaser** – tool for screw-cutting in a lathe.

'chassis ('ʃæsi) – frame and engine of a motor car, without the body (box-like part).

cha'toyancy (ʃæ'tɔiənsi) – (of jewels) showing of a band of light (like a cat's eye) which moves as the stone is turned round.

chaul'moogra oil (tʃɔɔ'muugrə -) – oil used to cure ↓ leprosy.

cheil-/ (kail) – the lips, e.g. **chei'litis** – inflammation of the lips. Also see chil-/.

'cheiro-/ ('kairo) – hand; see chiro-/.

'chela (kiilə) – part used for seizing and holding (e.g. in a crab); a claw; a talon; adj. **'chelate.**

CHELA

cheloid ('kiilɔid) – ↓ keloid.

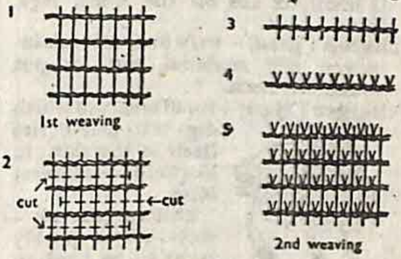
'chemical–substance in its pure state as studied by a **chemist** = scientist who studies the substances of which the Earth, universe, and living things are made. **'chemical e'quation** – way of writing a chemical action in which both sides of the "=" sign have the same atoms. Matter is neither created nor destroyed in a chemical action, so the atoms forming the substances on both sides must be the same: e.g. $Zn + 2HCl = ZnCl_2 + \uparrow H_2$ (zinc and hydrochloric acid produce zinc chloride and hydrogen); the arrow shows that the hydrogen is set free.

'chemo-receptor ('kiimo-) – a sense organ which responds to chemicals, e.g. the organs of taste and smell.

'chemo'therapy ('kemo'θerapi) – method of treating disease by means of a chemical which has an effect on the organisms (e.g. bacteria) which cause the disease without affecting the body of the sufferer, e.g. for syphilis – salvarsan: for pneumonia – sulphonamide. (Ordinary medicines, not those of chemotherapy, help the body to resist the disease, or make the results of the disease less uncomfortable, but do not attack the disease-producing organisms.)

'chemurgy ('keməədʒi) – (1) the application of chemistry to agriculture; (2) agriculture carried on for chemical purposes, e.g. growing potatoes for use in making industrial alcohol.

che'nille (ʃe'niil) – (carpet, cloth). Woven material is cut into a long piece consisting of a long woven thread in the centre with loose short fibres on each side; this is folded into a V and used as the cross thread in a second weaving, so producing a cloth covered with upstanding fibres.



CHENILLE

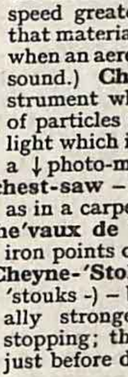
'cheno'podium oil ('tʃenə'poudiəm) – oil used to cure worms in the bowel.

'Cheren'kov radiation ('tʃerən'kɔf -) – light or other radiation produced when a charged atomic particle travels in a transparent material at a speed greater than that of light in that material. (Compare the "bang" when an aeroplane travels faster than sound.) **Cherenkov counter** – instrument which records the passing of particles by using this effect; the light which is radiated is detected by a ↓ photo-multiplier.

'chest-saw – small backless handsaw as in a carpenter's tool-chest.

che'vaux de 'frise (ʃə'voubə friiz) – iron points on the top of a wall.

'Cheyne-'Stokes breathing ('tʃein-'stouks -) – breathing getting gradually stronger, then weaker, then stopping; then again . . .; often so just before death.



CHIASMA

chi'asma (kai'æzmə)–crossing of lines like an X; crossing of fibres in the shape of an X, e.g. the **optic chiasma** = crossing of sight nerves in the brain.

'chicken pox – 'Varicella, an infectious disease, usually in childhood, causing spots on the body, chest, back: (the spots of ↓ smallpox are on the arms, legs, face).

chiffon ('ʃifɔn) – very fine, soft, plain-woven silk material, e.g. to put round the neck.

'chigger ('tʃigə) – small creature which digs into and buries itself in the skin; in England = Harvest Mite.

CHIGGER

chilled (metal) – metal cooled quickly so as to be hard on the surface. **chilled food** – food preserved by cold but not frozen hard.

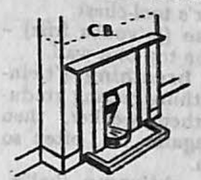
chil-o-/ (kail-) – lip. (Also see cheil-/).

'Chilo'poda ('kailo'poudə) – the class of centipedes, small creatures with many pairs of legs, the first pair being formed into poisonous claws.

CHILOPODA

chi'maera, chimera (kai'miərə) – plant produced by causing a branch or piece of a plant to grow in the stem of another in such a way that the tissue of one plant grows round (or as a strip inside) the tissue of the other. Thus one branch may carry two different kinds of flower.

'chimney-breast – brick chimney standing out from the wall into the room with a fireplace at its bottom.

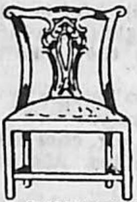


CHIMNEY BREAST

chin'chilla (tʃin'tʃilə) – rat-like animal whose grey fur is used for women's coats.

CHINCHILLA

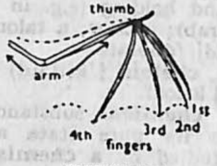
'Chinese-'white – zinc oxide paint.



CHIPPENDALE

chintz (tʃints) – cotton material with a printed pattern on a hard polished surface, used for chair-covers, etc.

'Chippendale furniture ('tʃipəndeil) – furniture as made by Chippendale (1718–79).



CHIROPTERA

chiro-/ – hand. **Chi'roptera** (kai'rɔptərə) – "handwings" – bats (because the wing is made of bones which, in man, are hand bones).

chi'ropody (-'rɔpədi) – treatment of feet (e.g. cutting away hard skin, etc.)

'chitin ('kaitin) – material of which the **'exo'skeleton** (outside shell) of insects and shell-fish is made.

'Chittenden's diet ('tʃitəndənz-daiət) – combination of measured quantities of foods which contain the least possible amount of protein necessary for health.

'chlamydo-/ ('klæmido-) – having a covering, e.g. **'chlamydospore** – spore of a fungus with a thick outer covering in its resting state.

chlo'asma (klou'æzmə) – areas of brown colour on the skin, e.g. before child-birth and the time of women's "change of life" (age 40–50); also in ↓ tuberculosis.

'chloral ('klɔːræl) – medicine made by the action of chlorine on alcohol, used to produce sleep; $CCl_3.CHO$.

'chloram'phenicol – other name for ↓ chloromycetin.

'chlo'rella (klɔː'relə) – kind of green ↓ alga which could be cultivated and possibly used for food.

'chlorine ('klɔːriːn) – chemical element, a heavy yellow-green gas used, e.g., to whiten cloth. Common salt is **sodium chloride. chloric acid,** $HClO_3$. **chlorates** – salts of chloric acid, e.g. **potassium chlorate** ($KClO_3$) – an explosive white powder. **chlorides** – salts of ↓ hydrochloric acid. **chlorinate** ('klɔɔrineit) – treat with chlorine, e.g. in purifying water.

'chloroform ('klɔrəfɔɔm) – heavy colourless liquid, $CHCl_3$; used to produce unconsciousness during surgery.

'chloro'mycetin ('klɔɔro'maisitin) – substance obtained from a South American soil fungus (also made in the laboratory); used to cure ↓typhus and ↓typhoid fever: also called **chloramphenicol.**

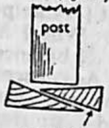
'Chloro'phyceae ('klɔɔro'faisi) – the green ↓algae.

'chlorophyll ('klɔrəfil) – green colouring-matter of plants found in small Bodies (= **chloroplasts**) in the cells. Chlorophyll *A* is yellow-green; Chlorophyll *B* is blue-green. Chlorophyll is a ↓catalyst and enables the plant to make sugar from carbon dioxide and water in the sunlight.

chlor-'promazine – drug used as a tranquilliser (to make one forget worries and feel happier).

'chloroquine ('klɔɔrəkwin) – drug used for the treatment of malaria.

chock (tʃɔk) – V-shaped piece of wood used with wooden posts to hold up a roof or beam, or to stop something from moving about, e.g. an aeroplane on the ground.



CHOCK

chock-a-block – also called "two-blocks", one pulley-block pulled tight up against another pulley.

choke (tʃouk – (mechanical): narrow part of pipe; gun-barrel smaller at the outlet-end so as to keep the shots from spreading; part of the ↓carburettor of a car which controls the amount of air let in.

choke – (electrical) – a coil of wire (sometimes round a soft iron bar). When the current is made stronger or weaker the coil sets up (causes) a back-pressure which tries to keep the current at the same strength. Thus the coil opposes the flow of alternating current, and the higher the frequency (greater the number of changes per second) the greater this opposition. So a choke can be used to separate a high frequency from a low frequency current. If there is no change of direction of the current, there is no back pressure; so a choke can be used to separate direct current from alternating current.

'choke damp – carbon dioxide gas (CO_2) left after explosion in a coal mine.

chol-/ – bile, yellow-green liquid passed from the liver into the bowel through the ↓gall-bladder to help digestion of fats. **'chola'gogue** ('kɔlə'gɔg) – medicine which causes flow of bile. **'cholecys'titis** ('kɔlisis-'taitis) – inflammation of the gall bladder.

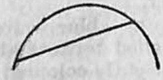
'cholera ('kɔlərə) – an infectious disease in hot countries; the bacteria are carried in food and water; the disease causes continual emptying of the bowel and vomiting; death comes from weakness and loss of liquid from the body.

CHOLERA

cho'lesterol (kə'lestərɔl) – a substance found in all cells of the body, but especially in nerve-cells. Gall-stones (hard masses formed in the ↓gall-bladder) are composed of cholesterol (with other substances). Cholesterol helps in the carrying of fat and in the formation of oil on the skin and hair; and is used to make body-controlling substances (↓hormones).

'choline ('kouliin) – substance found in all cells, but especially in ↓bile and in the brain; it is a part of ↓lecithin. **'acetylcholine** ('æsitail-) – a substance formed at the nerve-ending which causes a muscle to contract.

chondr-/ -o-/- (kɔndr-) – (1) cartilage (soft bone-substance with no lime in it), e.g. **chondroma** – tumour (diseased growth) made of cartilage cells; (2) grain, e.g. **'mito'chondria** ('maito-) – small grain-like or rod-like Bodies in a cell.



CHORD

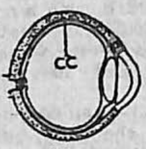
chord (kɔɔd) – straight line drawn between two points on a curve.

'Chor'data ('kɔɔ'deitə) – the large class of animals which have a notochord (central elastic rod, corresponding to the spine in man) or spine (with only the remains of a notochord in the early stages). The class includes a few simple marine animals (e.g. ↓amphioxus) and all the ↓vertebrate animals, including Man.

cho'rea (kɔ'riə) – St. Vitus' Dance, a disease (especially of children) causing uncontrolled muscular movements.

'chorioallan'toic membrane ('kɔrioælæn'tou.ik-) – a very thin membrane covering the living substance in an egg (not the thick fibrous membrane just inside the shell): ↓virus is grown on it in the laboratory.

'choroid coat of the eye ('kɔrɔid -) – middle of the three coats; it contains the blood supply.



CHOROID COAT

chrom-/- (kroum-) – colour. **'chromatin** – part of the substance of a cell which takes up a dye, the rest being left undyed.

chro'matic 'aber'ration – the failure of a lens to bring rays of different colours to the same point. ↓achromatic.

chroma'tography – method of chemical analysis by absorbing a solution by Fuller's earth (a form of clay), alumina (aluminium oxide), specially prepared paper, etc., and noting the different levels taken up by the different substances of the solution.

'chromato'phores ('kroumәto'fɔɔz) – Bodies in cells which contain colouring-matter, e.g. in plants and skins of animals (e.g. in a **cha'meleon** – lizard which changes its colour).

'chromic acid ('kroumik -) – chromium trioxide + water; its salts (**chromates**) are used in dyeing and photography: H_2CrO_4.

'chromium ('kroumiəm) – blue-white metal element, so-called because all its compounds are brightly coloured; it gives the colour to the jewels emerald, sapphire, ruby; it is used to plate metal to protect it against rust, also in making stainless steel. The red-hot wires of an electric heater are made of nickel-chromium.

'chromophores ('kroumofɔɔz) – certain groups of atoms which cause the colouring power of dyes, e.g.—N:N—.

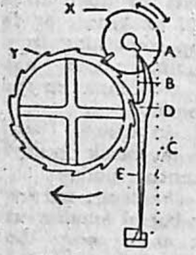
'chromosomes ('krouməsoumz) – When a cell divides, the ↓chromatin (colour substance) arranges itself on short rods called chromosomes (colour-bodies). The number of chromosomes is fixed for each species (kind of plant, animal, etc.); in man there are 46 chromosomes. The chromosomes carry the various inherited units which make up the nature, character, etc. of the young plant, or animal. ↓mitosis.

'chromos'phere – the outer layer of the sun.

chron-/- (krɔn-) – time, e.g. **'chronograph** – stop-watch as used to take the time of races; also an instrument which shows time on a moving strip of paper.

chro'nometer (krə'nɔmitə) – a very accurate clock.

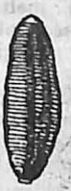
chronometer es'capement (- es'keipmənt) – Wheel *X* is the ↓balance wheel. As it turns to the left, the peg *A* presses against the **detent** (di'tent) spring, *B*, so moving the whole piece *C* to the right. This takes away the stop, *D*, from the tooth of wheel *Y* and lets the tooth pass. Piece *C* then springs back to where it is held by the peg *E*, and stops the next tooth. Wheel *X* swings back in the opposite direction (to the right). Spring *B* is a loose spring fixed to *C* only at its bottom end, and the peg *A* pushes past it, and then comes back again. So the escapement acts at every other swing of the balance wheel; it is more accurate than other escapements and needs no oil.



CHRONOMETER ESCAPEMENT

'chronoscope ('krɔnəskoup) – instrument for measuring very small intervals of time, e.g. 1/1000 second; it is controlled by a ↓ tuning-fork, which, when vibrating at its correct note (1,000 vibrations per second) allows the teeth of a wheel to pass.

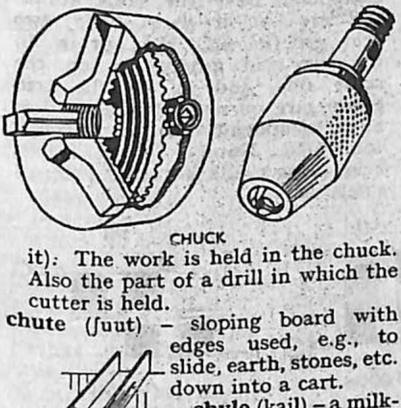
'chrysalis ('krisəlis) – the state of a butterfly (moth, etc.) in which it becomes inactive and enclosed in a hard container while changing from larva into the flying state.



CHRYSALIS

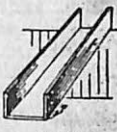
'chryso-/ ('kriso-) – yellow-green, e.g. **'chryso'beryl** (-beril) – a yellow-green jewel, composed of beryllium aluminate. **'chrysoprase** (- preiz) – apple-green silica jewel. **chrysopterin** – ↓ pterins.

chuck (tʃʌk) – part of a lathe (for turning metal or wood while cutting it): The work is held in the chuck. Also the part of a drill in which the cutter is held.



CHUCK

chute (ʃuut) – sloping board with edges used, e.g., to slide, earth, stones, etc. down into a cart.



CHUTE

chyle (kail) – a milk-like liquid consisting of ↓ lymph mixed with particles of fat absorbed by and passed through the wall of the bowel. This liquid is carried to the ↓ thoracic duct, which carries it to be mixed with the blood-stream at a place in the neck.

chyme (kaim) – the liquid (partly digested food and digestive juices) which is passed from the stomach to the bowel.

(underside)

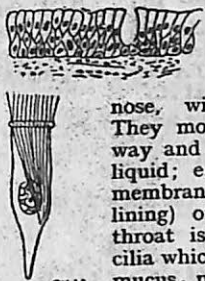
CICADA

ci'cada (si'kaadə) – group of insects which make a noise by means of a special organ in the upper part of the body.

'cicatrix ('sikətriks) – the mark left after a wound has healed.

/-cide (-said) – killer of, e.g. **in'secticide** – substance used to kill insects.

'cilia ('siliə) – ("eyelashes"): very small thread-like outgrowths from surface cells, e.g. of the mouth, nose, windpipe, bowel. They move in a regular way and cause a flow of liquid; e.g. the mucous membrane (soft inner lining) of the nose and throat is kept clean by cilia which keep the liquid mucus moving over it. Cilia are used by small water-creatures, e.g. paramecium ,for moving along. (Singular *cilium*.)



CILIA

'ciment 'fondu ('siimɔn-'fɔndu) – quickly hardening cement made from lime and bauxite (aluminium ore); it resists sea-water.

'cimex ('saimeks) – wingless, blood-eating insect: bed-bug.

CIMEX

cin'chona (sin'kounə) – the plant from which quinine is got.

'cincture ('siŋktuə) – ("belt"): plain ring round the top or bottom of a pillar.

'cingulum ('siŋgjuləm) – ("waist-belt"): circular band, e.g. outstanding part of a tooth just above the membrane (gum) covering the jaw-bone.

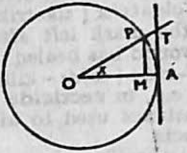
'cinnabar ('sinəbaa) – sulphide of mercury, mercury ore.

cinque-/- (siŋk-) – five, e.g. **'cinque-'foil** – five-leaf decoration.

'cipher ('saifə) – (of one note-pipe in a musical organ as in a church): to go on sounding continuously owing to a fault.

'circuit (electrical) ('səəkit) – circular path followed by electricity, e.g. battery – to lamp – and back to battery.

circular functions – The sine, cosine, and tangent of an angle are used in calculations about triangles. These quantities are related to a circle and so are sometimes called circular functions. *O* is the centre of a circle, *OA* and *OP* are radii. *PM* is drawn at right angles to *OA*, and *TA* is the tangent (touching line) at *A*.



CIRCULAR FUNCTIONS

The sine of the angle *X* is:

$$\frac{PM}{OP} = \frac{PM}{\text{radius}}$$

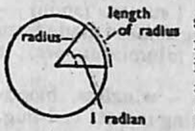
The cosine of the angle *X* is:

$$\frac{OM}{OP} = \frac{OM}{\text{radius}}$$

The tangent of the angle *X* is:

$$\frac{TA}{OA} = \frac{TA}{\text{radius}}.$$

circular measure – system of measuring angles in radians. A radian is the angle opposite to a length of the circumference equal to the radius. 2π radians (= about 6·283 radians) = one complete circle.



CIRCULAR MEASURE

'circu'latory system – blood supply from the heart, through the arteries and veins to the heart, and back through the lungs to the heart.

circum-/ – round, e.g. **cir-'cumference** (səə'kʌmfərəns) – the line which forms a circle; the length of this line.

'circum-nu'tation (-nju'teiʃən) – the circular movement of the tip of a growing plant.

'circum'scribe (-'skraib) – to draw a figure round another figure, e.g. to draw a circle passing through the points of a triangle.

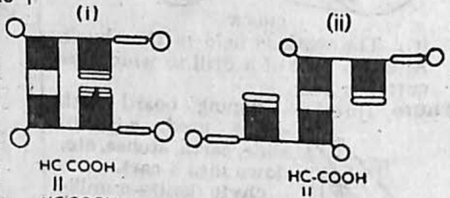
c'ire-perdu ('siiə-'peədu) – ("wax – lost"): way of casting works of art in metal. A wax figure is made and covered with plaster; the wax is then melted out and melted metal is driven in; (used also in making gold plates for artificial teeth).

ci'rrhosis (si'rousis) – ("yellowing") a diseased condition of an organ, e.g. of the liver, in which the proper substance of the organ is replaced by a fibrous tissue.

'cirro-/, 'cirrus ('siro, 'sirəs) – ("a curl"): white clouds made of ice crystals at about 25,000 (or more) feet height: (plants) – curled, outgrowing part by which a climbing plant holds on.

cis-/ (sis-) – on this side of, on the same side of.

'cis-compounds – Diagrams (i) and (ii) show the arrangement of the atoms in two compounds. Both compounds have the same atoms, and are similar (both have two acid groups –COOH), but in (i) the two acid groups are on the same side, and in (ii) the acid groups are on opposite sides. (i) is a cis-compound; (ii) is a trans-compound. Number (i) is maleic acid, (ii) is a fumaric acid. ↓ stereo-isomerism.



$$\begin{array}{l} HC\ COOH \\ \| \\ HC.COOH \end{array}$$

Maleic Acid

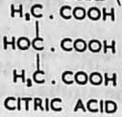
$$\begin{array}{l} HC\text{-}COOH \\ \quad \| \\ HOOC.CH \end{array}$$

Fumaric Acid

CIS

cis-lunar space – the space between the Earth and the orbit of the Moon.

'citric 'acid ('sitrik) – the acid which causes the sour taste of many fruits, e.g. of lemons. ↓ Kreb's.



$$\begin{array}{l} H_2C.COOH \\ \;| \\ HOC.COOH \\ \;| \\ H_2C.COOH \end{array}$$

CITRIC ACID

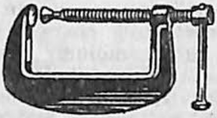
'citro'nella ('sitrə'nelə) – sweet-smelling oil ("lemon oil") obtained from a grass; used to keep insects away.

'citrus plants ('sitrəs) – fruits of the lemon, orange family.

Cl – chemical sign for ↓ chlorine.

clad-/-o-/ (kleid-o-) – small branch of a plant, e.g. **'clado'carpous** – having the fruit at the end of a side-branch. **'cladode** – flattened branch which looks like and does the work of a leaf.

'cladding ('klædiŋ) – covering a metal with brick or another metal, e.g. to protect against water.



CLAMP (CRAMP)

clamp – (1) carefully arranged heap of bricks, potatoes, etc.; (2) screw-instrument used, e.g., to hold together glued pieces till they stick = ↓ cramp.

clap-boards – boards with edges so cut that one board fits down over the next, e.g. fixed to the side of a house.

Clarendon (klærəndən) – very black printer's type with thick lines: as shown.

-clase (-kleiz) – broken, e.g. **plagioclase** ('plædʒio-) – form of igneous (heat-formed) rock (a ↓ feldspar) whose crystals break in a slanting direction: (*plagio* = at an angle).

/-'clasis ('kleisis) – breaking, e.g. **osteoclasis** ('ɔstio-) – breaking a bone so as to set it again better.

/-clast (klæst) – which breaks, e.g. **osteoclast** – cell which breaks down and destroys bone, e.g. the roots of the first (milk) teeth are destroyed by osteoclasts so that the teeth fall out and are replaced. **/-clastic** – which breaks, e.g. **osteoclastic.**

'clastic rocks ('klæstik) – rocks made of broken pieces of igneous (heat-formed) or water-deposited rocks.

'claudi'cation ('klɔɔdik-) – difficulty and pain in walking; lameness. **intermittent claudication** – lameness from time to time, e.g. after a short walk, due to interference in blood-supply to the muscles (as in ↓ arteriosclerosis).

'claustro'phobia ('klaustro'foubiə) – fear of being shut up in an enclosed place.

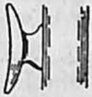
'clava ('klævə) – a club, a long thing with a large end; **clavate** – club-shaped.

CLAVICLE

'clavicle (klævikəl) – the collar-bone (in front of shoulder at right-angles to the neck; so-called because it is shaped like a club).

'claw-hammer – hammer with a V-shaped cut used for pulling out nails.

'clearance ('kliərəns) – space left so that one thing does not hit another in moving past it.



CLEAT

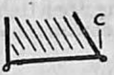
cleat (kliit) – (1) a small piece of wood, e.g. nailed on to a larger piece; (2) a wooden block in a wall used to fix up a shelf; (3) a V-shaped thing, a wedge; (4) a double peg for fixing a rope in an 8-shape.

'cleavage, plane of ('kliividʒ) – layer along which a crystal splits.

'cleft 'palate ('kleft-'pælət) – (cleft = split): gap between the two sides of the bony roof of the mouth when the bones have not joined up as they should.

'clench a nail (klenʃ) – bend the point of a nail into a J shape and drive it back into the wood: also spelt **clinch.**

clew (kluu) – the bottom corner of a sail. **clew lines** – ropes fixed to bottom corners of a sail for pulling the corners up.



CLEW

'clicking – (boots and shoes): cutting out the upper parts from the leather.

'climac'teric ('klaimæk'tərik) – change in the glands of a woman at the age of about 45 when she can no longer have children.

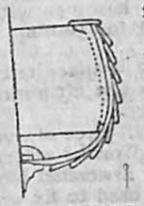
clin-/- (klain-) – lean, slope, e.g. **cli'nometer** – instrument for measuring the angle of hills. **/-cline** – slope, e.g. **'incline** (on railway) – slope of a hill. ↓ anticline.

clinch – ↓ clench. **clincher** – ↓ clinker built.

clinic (klinik) – place at which medical advice and help are given.

'clinical ('klinikl) – (*clin-* = bed): having to do with sick persons in bed, e.g. **clinical thermometer.** **'clinical medicine** – the study and treatment of sick persons at the bed-side (not merely in the laboratory); so also **clinical instruction** – teaching medicine at the bed-side, not merely in the lecture-room or laboratory.

'clinker – hard mass of unburnable material left in a furnace.



CLINKER BUILT

clinker built (boat) – with the boards at the sides lying over one another; also spelt **clincher.**

clo'aca (klou'eikə) – drain-pipe; waste-pipe of the body in certain creatures.

clockwise – moving in the same direction as clock hands.

CLOCKWISE

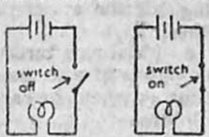
cloi'sonné (klua'zɔne) – Wires are fixed onto metal to make enclosed spaces on the surface; these are filled with powdered glass (etc.); this is heated so that the glass melts, making a coloured design. ↓ champlevé.

clone (kloun) – set of plants obtained by growing pieces of one original plant (not by seeds), e.g. potatoes.

'clonic con'traction, clonus ('klɔnəs) – short sudden tightening of the muscles, then loosening, then tightening, etc.: (a **tonic** contraction remains tight).

closed chain – ↓ chain.

closed circuit – electric circuit in which there is a complete path for the current to flow, e.g. the lighting circuit in a house after the switch has been put on.

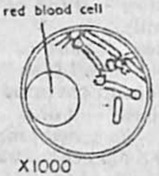


open circuit closed circuit

CLOSED CIRCUIT

closed-circuit television – television circuit in which the camera is joined by cables (wires) directly to the set which reproduces the picture.

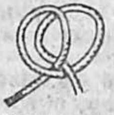
clos'tridia (klɔs'tridiə) – bacteria which cause ↓ tetanus, also (another kind) ↓ gas gangrene; both found in the droppings from the bowels of horses and in the soil. The picture shows the clostridia of tetanus × 1000: the small round things are spores.



CLOSTRIDIA

cloud chamber, expansion chamber – a container with gas (e.g. oxygen) and water-vapour in it. When an electrically charged particle (e.g. from radium) passes through the chamber it leaves a track of ions (electrified atoms or molecules). The gas is suddenly expanded. This makes water-vapour condense and form drops of water on the ions, thus making a white path which shows up the track of the particle.

clove-hitch – knot as shown for tying a rope on to a bar.



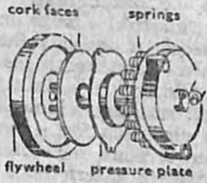
CLOVE HITCH

club-foot – bad shape of the foot (usually from birth) so that it does not go flat on the ground. ↓ talipes.

club-moss – small plant which looks something like moss, but reproduces like a fern (↓ alternation of generation). Such plants, as big as trees, grew in the Carboniferous Age, and coal is largely formed from them. ↓ lycopodium.

CLUB MOSS

club-root – disease of plants of the cabbage family causing thickening of the root.



CLUTCH

clutch (klʌtʃ) – instrument by

which the engine is joined to (or set free from) the thing driven (e.g. car). When the clutch is "out" (free) the car does not move, though the engine is running.

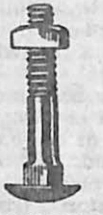
'clyster ('klistə) – ↓enema.

cnid-/ (knaid-) – sting, e.g. **'cnidoblast** – stinging cell, e.g. of a jellyfish.

Co – chemical sign for ↓cobalt.

CO_2 – the chemical formula of carbon dioxide gas (one carbon atom with two atoms of oxygen), the gas which we breathe out (together with unused air), and which also comes from a burning fire.

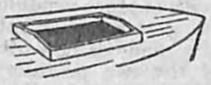
coach screw – large wood-screw with a square head. **coach bolt** – bolt with a round head and a square just below it.


COACH BOLT

co'agulate (kou'ægjuleit) – come together into a solid mass, e.g. milk is coagulated when it becomes sour; blood coagulates (=clots) when it forms a jelly-like (and later hard) mass in a wound.

'Coalite ('koulait) – coke made at a low temperature so as to leave in it some easily-burnt matter; used instead of coal in houses: (trade name).

'coaming ('koumiŋ) – raised edge round a hatchway (inlet through the deck to the inside of a ship).


COAMING

'coarc'tation ('kou.aak'teiʃən) – pressing together of the walls of a vessel in the body so narrowing the passage-way, especially of the aorta (main blood-vessel from the heart).

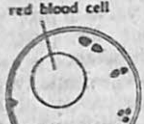
'coasting – running a bicycle, car, engine without power, as in going downhill.

co'axial cable (kou'æksiəl-) = **con'centric tube feeder** – electric wire used to carry high-frequency currents, e.g. in television and in long-distance telephone; a central wire runs through a metal tube (e.g. 0·375 inch diameter outside), being held in place by round non-conducting pieces at short distances apart.

co'balt (ko'bɔɔlt) – metal element, used to make cutting tools which do not soften when hot, also to make colours and paints especially for glass and china. **cobalt 60** – an artificial ↓radio-isotope of cobalt used instead of radium in cancer treatment and for other medical and industrial purposes.

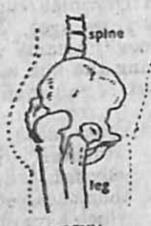
co'caine (kɔ'kein) – drug obtained from the coca plant (and made in the laboratory), used to prevent pain in surgery.

'coccidi'osis ('kɔksidi'ousis) – bowel-disease of poultry and liver disease of rabbits caused by protozoa (single-cell organisms – not bacteria.)



COCCUS

'coccus ('kɔkəs) – round or oval bacterium, e.g. pneumococcus, the organism of pneumonia, staphylococcus – organism of septic wounds. (Picture – pneumococcus × 1000: the round thing is a red blood cell.) Plural **'cocci** ('kɔkai).



COCCYX

'coccyx ('kɔksiks) – the tail-bones in man.

COCHLEA

'cochlea ('kɔkliə) –)" snail-shell"): the spiral organ inside the ear with which we hear. (Also see labyrinth for picture.)

'cockpit – the part of a small sailing boat in which the man steering it sits; partly covered place in which the pilot of a small aeroplane sits.

co'coon (kə'kuun) – silky covering in which a moth (or butterfly) is formed, e.g. the cocoon of a silkworm.

colo'boma (kɔlo'boumə) – a hereditary fault in the development of the eye.

'colophon ('kɔlɔfɔn) – an ornamental design printed on the title-page (first, name-bearing, page) of a book, also on the back edge.

color-/ – colour, e.g. **colo'rimetry** (kɔlə'rimitri) – measurement of colours.

Colo'rado beetle ('kɔlə'raadou) – a beetle which destroys potato-plants.

COLORADO BEETLE

co'lostrum (kɔ'lɔstrəm) – the first milk of an animal after the birth of young.

'colour code – way of showing the sizes of electrical parts (e.g. ↓ condensers, ↓ resistors) by marking them with different colours. Wires (e.g. in a radio set) are also coloured to show which parts they join.

'colour-index (of a star) – Light which seems brighter to the eye is of longer wavelength (more red) than that which has the strongest effect on a photographic plate. Thus a reddish star may seem bright to the eye but is not bright in a photograph. The difference between the brightness as shown in a photograph and the brightness as seen by the eye is the colour index of the star. It gives the simplest way of finding the temperature of a star. **colour-index of blood** – measure of the amount of haemoglobin (red substance of blood) in each red blood-cell, and so of its power of carrying oxygen.

colp-/ -o- (kɔlp-) – having to do with the vagina (female organ through which the young passes out at birth).

co'lumbium (kɔ'lʌmbiəm) = ↓ niobium.

co'lustrum = ↓ colostrum.

'colza oil ('koulzə -) – oil from the seeds of a plant of the cabbage family, used for lighting, and in making steel.

'coma ('koumə) – (1) complete unconsciousness; (2) a group of hairs; **comal, comate, comose** – hairy.

'combi'nations ('kɔmbi'neiʃənz) – Example; How many different sets of 3 flags can be made from 6 different flags? We can have 120 different ↓ permutations (arrangements) of any 3 flags but some of these arrangements form the same set (e.g. red, blue, green; red, green, blue). The number of combinations is

$$\frac{\textit{Number of permutations}}{1 \times 2 \times 3 \ldots}$$

We divide by as many numbers as there are things in the set. The number of combinations of 3 out of 6 different things is

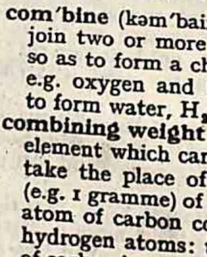
$$\frac{6 \times 5 \times 4}{1 \times 2 \times 3} = 20.$$

com'bine (kəm'bain) – (chemically) – join two or more elements together so as to form a chemical compound, e.g. oxygen and hydrogen combine to form water, H_2O.

combining weight – the weight of an element which can combine with (or take the place of) one unit weight (e.g. 1 gramme) of hydrogen: e.g. one atom of carbon combines with four hydrogen atoms: the atomic weight of carbon is 12, its combining weight is $\frac{12}{4} = 3$. ↓ equivalent weight.

'comet ('kɔmit) – a Body with a bright "tail" which moves in a long, thin orbit round the sun.

co'mmensalism (kə'mensəlizm) – (*co-* = with; *mensa* = table): two organisms sharing the same food and living together, but not in such a way that they are necessary to each other or cannot do without the other (as in ↓ symbiosis). Example, an anemone living on the shell of a crab.



COMMENSALISM

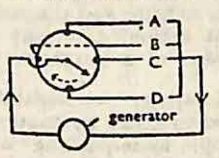
co'mmensurable quantities (kə'mensiurəbl -) – quantities which can be compared exactly, e.g. 5 ft. and 2 ft.; the side of a square (e.g. 1 ft.) and the line joining opposite corners (e.g. 1·414 . . . ft.) are incommensurable.

'comminute ('kɔminjut) – break into very small pieces. **comminuted fracture** – fracture of a bone in which the bone is broken into small pieces.

'commissure ('kɔmisiuə) – a joining as if the two pieces were sewn together, e.g. bones of the skull.

communication theory – the study of the sending and receiving of information by physical means (e.g. by radio, telegraphy, etc.). Also called **information theory.**

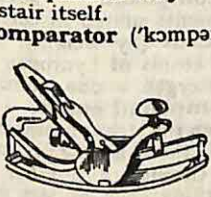
'commutator ('kɔmjuteitə) – instrument used to send electric currents into several electric circuits, one after another, e.g. in a car the current is sent to make a spark in each cylinder in turn. Also used in an electric generator to make alternating current into direct current.



COMMUTATOR

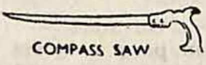
com'panion (kəm'pæniən) – covering over a ladder or stair in a ship. **companion-way** – the ladder or stair itself.

'comparator ('kɔmpəreitə) – instrument for comparing lengths (or colours) very accurately.



COMPASS PLANE

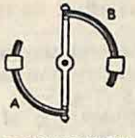
'compass plane ('kʌmpəs-) – plane with a curved bottom. **compass saw** – ↓ keyhole saw.



COMPASS SAW

com'patible (drugs) (kəm'pætibl) – which can be mixed together without reacting to form a poison or useless substance.

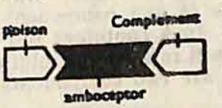
'compensate ('kɔmpenseit) – ("weigh with"): give a weight equal to; e.g. pay money equal to the value of the goods which a person has lost: do something to correct the results of a mistake or fault in a machine without correcting the fault itself.



COMPENSATION BALANCE

'compen'sation 'balance ('kɔmpen'seiʃən-) – balance-wheel of a clock or watch so made that (although it is affected by changes of temperature) it does not give wrong time. In a compensated balance, *A* and *B* are made of two layers of metal; as they become larger with heat, they become more curved, because one metal expands more than the other, so the weights are carried nearer in towards the centre.

'complement ('kɔmplimənt) – amount needed to make up a total, e.g. the **complementary angle** of the angle 50° is 40° (50° + 40° = one right angle, 90°). **complementary colours** – two colours which mixed together (e.g. as two coloured beams of light on a screen) make white, e.g. a certain blue-green and red.



COMPLEMENT-FIXATION

'complement-fixation ('kɔmplimənt fik'seiʃən) – A poisonous substance (e.g. bacteria, or the blood of some *other* animal) entering the blood is called an **antigen**; it causes the blood to produce a substance which acts against the poison. The substance so produced is called the **antibody.** The antibody cannot destroy the poison unless it has a substance to act with it: this substance (which is in the blood already) is called the **complement.** The antibody acts as a chain joining together the poison and the complement; it takes hold of each so the antibody is also called the **amboceptor**: (*ambo-* = both, *cept-* = take hold of). If the complement is not present, or if it has already been used up (fixed) in acting against some other poison, the antibody is unable to act. ↓ Wassermann.

'complex – a set of emotions centred upon one object (e.g. nation, father, sex, etc.). The word is generally used of a repressed complex (pushed down below the consciousness but having an unconscious effect on the behaviour).

'complex number – a real number joined with an ↓imaginary number, e.g. $5 + \sqrt{-1}, 3 - 5 \times \sqrt{-7}$.

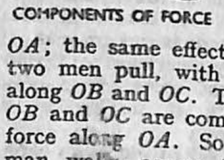
com'pliance – yielding-ness, e.g. of a spring.

'compo ('kɔmpou) – cement used to make decorations on a ceiling. **compo board** – narrow pieces of wood glued together and covered with strong paper used in building. **compo pipe** – easily bent gas-pipe made of lead-alloy.

com'ponent (kəm'pounənt) – one of two or more parts which make up a whole, e.g. parts used to make up a machine or instrument. **chemical components** – The number of components is the smallest number of chemical substances (*not* "smallest number of elements") with which a certain equilibrium (balanced, not changing state) can be produced; e.g. in ice, liquid water, water-vapour there is one component – H_2O, water. In a container full of undissolved salt in a strong solution of salt there are two components – salt, water.

components of electric current – different currents (alternating and direct) joined together but able to be separated, e.g. by means of a ↓choke.

components of force – One force is sometimes made up from, and can always be replaced by, two (or more) forces. Thus one man can pull a cart along the line *OA*; the same effect is obtained if two men pull, with certain forces, along *OB* and *OC*. The forces along *OB* and *OC* are components of the force along *OA*. So also speed: a man walks across the deck of a moving ship: the components of his speed are the speed of the ship in the direction *OS* and his walking speed in the direction *OD*.



COMPONENTS OF FORCE

Com'positae (kɔm'pɔsitii) – family of plants which have many florets (little flowers) crowded together in one flower (e.g. daisy).

COMPOSITAE

'compo'sition ('kɔmpə'ziʃn) (chemical) – the elements in a substance and the proportion of each. **composition of forces** – combining ↓component forces acting in different directions so as to find the result of their joint action: this may be done by means of a graph or by calculation.

'compost ('kɔmpɔst) – vegetable matter caused to decay by bacterial action; damp, loose-packing and nitrogen-giving chemicals speed-up this process. The result is a rich soil for plants.

'compound ('kɔmpaund) – not simple, but made up of a number of parts or substances, e.g. **compound leaf** – leaf made up of a number of small leaves. **compound magnet** – magnet made up of several pieces of iron. **chemical compound** – several chemical elements united in certain fixed proportions (by weight), e.g. H_2O = two atoms of hydrogen + one atom of oxygen = one molecule of water. **compound engine** – an engine in which the steam passes into a high- and then a low-pressure cylinder, or through a number of cylinders working each at less and less pressure. **compound ↓fracture.**

Compound E – ↓cortisone.

com'press (kəm'pres) – press together, press into a small space, e.g. the air in a hard bicycle tyre is compressed. **'compress** ('kɔmpres) – piece of cloth put in (usually cold) water and laid on the body, e.g. to prevent a bruise.

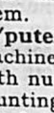
Compton effect ('kɔmptən -) – When X-rays are scattered by a light (not heavy) chemical element (e.g. carbon) their wavelength becomes longer; this shows that X-rays behave as particles (not waves) and that they bounce off the carbon (as one ball bounces off another) losing some of their energy – as shown by the lengthened wave.

com'pulsion neu'rosis (kəm'pʌlʃən niu'rousis) – a form of disorder of the mind in which the sufferer feels that he must do certain things (e.g. touch every post along the road) and feels anxious if he does not do them.

com'puter (kəm'pjuutə) – calculating machine. A **digital computer** deals with numbers (digits) by the actual counting of definite things (e.g. electrical pulses) and so can make arithmetical calculations. In an **analogue computer** the numbers are changed into physical quantities (e.g. electric currents) and calculations can be made about quantities which are varying. Analogue machines are often cheaper, simpler but less accurate than digital machines.

co'nation (kou'neiʃən) – conscious desire to act.

'concave ('kɔnkeiv) – (lens) curved inwards (not outwards like a ball – which is convex); so also concave mirror.



CONCAVE LENS

'concen'tration ('kɔnsen'treiʃən) – e.g. of a solution; its strength; weight of substance dissolved in a certain amount of water.

con'centric circles (kən'sentrik -) – several circles with the same centre. ↓ eccentric. **concentric tube feeder** – ↓ coaxial.

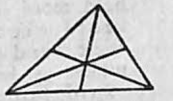
con'ception (kən'sepʃən) – fertilizing of a female reproductive cell by a male reproductive cell.

conch-/ – shell (of a shell-fish), e.g. **con'chology** (kɔŋ'kɔlədʒi) – the study of shells. **con'choidal fracture** – e.g. of glass: a broken edge which is of a curved-in, shell-like shape (because the outside surfaces are harder than the inside).

'concrete ('kɔnkriit) – mixture of cement, sand and small stones used for building.

con'current (kən'kʌrənt) – ("running together"): acting together at the same time.

con'current lines – lines which pass through the same point, e.g. the lines from the points of a triangle to the middle points of the opposite sides are concurrent.

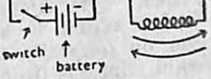


CONCURRENT LINES

con'cussion (kən'kʌʃən) – loss of consciousness caused by a blow on the head.

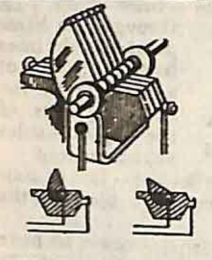
con'dense (kən'dens) – cause to have less volume, to fill less space, to be more dense; to change from vapour to liquid. **'conden'sation**, n. **chemical condensation** – (1) joining together molecules by taking out simple molecules, e.g. of water, e.g ↓ bakelite; (2) joining simple molecules into a chain; ↓ polymerization.

con'densed 'nucleus (- 'niukliəs) – (in chemistry) two rings joined by a common part, as in ↓ naphthalene.



CONDENSER

con'denser (electrical) – also called **ca'pacitor** (kə'pæsitə) – two metal plates separated by air or other insulator (non-conductor), e.g. mica, waxed paper, plastic. This arrangement of plates can hold a large amount of electricity without the pressure (voltage) between the plates being high. See picture. When the switch joins the battery, electrons crowd on to plate 1 and leave plate 2. (This flow soon stops because the electrons cannot get across from one plate to the other.) If we now take away the battery, the condenser-plates still hold the electric charges: there may be enough electricity in them to give a shock if you touch them. If the plates of a condenser which holds an electric charge are joined by a coil, the current flows backwards and forwards between the plates, passing through the coil each time: ↓ acceptor circuit. In a **variable condenser** the plates can be moved so that more (or less) surface of one plate is opposite the other plate. This makes them hold more (or less) electricity, and so makes a less rapid (more rapid) to-and-fro flow from one plate to the other through a coil. ↓tuning.



VARIABLE CONDENSER

condenser (lens) – the large lens which brings the light on to a lantern slide or cinema film.

condenser (steam) – instrument for cooling steam and changing it back to water, e.g. by passing the steam through tubes in water so that the heat goes into the water; the water seen flowing out from a ship's side is the **condenser water.**

con'ditioned 'reflex (kən'diʃənd-'riifleks) – A reflex action is an action which you do naturally in answer to a certain stimulus (thing which causes you to act), e.g. you naturally get a flow of saliva (liquid in the mouth) when you see food if you are hungry. A conditioned reflex is a reflex which has been changed by practice or training; e.g. a bell is rung every time food is given to a hungry animal; when the animal smells the food he has a flow of saliva. In time the bell alone, without the food, causes a flow of saliva; so Smell→Saliva has been changed to Sound of bell→Saliva.

con'duction (kən'dʌkʃən) – passing electricity along a substance (e.g. wire), passing heat along a substance (e.g. metal bar). A good **conductor** allows electricity (or heat) to pass easily; it has a low resistance. **conductivity** – power of conducting. **conductance** (of an electric wire) – the opposite of resistance; 1 ÷ resistance.

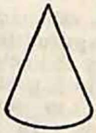
'conduit ('kɔndit) – a large pipe (e.g. underground pipe) to carry water, or to contain electric-supply wires.

'condyles ('kɔndailz) – rounded ends of a bone which act like a hinge and have muscles fixed to them, e.g. at the knee.

CONDYLE

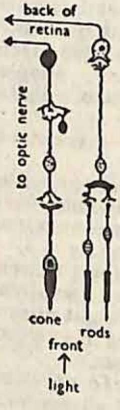
'Condy's 'fluid ('kɔndiz 'fluuid) – sodium sulphate and sodium permanganate used as a disinfectant: (trade name).

cone (koun) – (1) figure with a circular bottom and pointed top; (2) the part of a ↓gymnosperm (e.g. fir tree) in which the fertilized seeds are carried: for picture, see Coniferae.



CONE

cones (eye) – nerve-endings in the eye sensitive to bright light: the **rods** are used for seeing at night, the cones by day.



CONE

'coney ('kouni) – fur for ladies' dresses, made from rabbit skin.

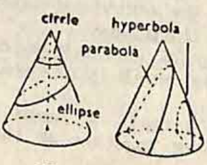
con'figu'ration (kən'figjuə'reiʃən) – arrangement of things in space sideways, back to front, up and down; the arrangement of atoms in a molecule as in a model – not as in a flat drawing.

'confluent ('kɔnfluənt) – flowing together; e.g. diseased spots on the skin (e.g. in smallpox) which join up into a larger spot are confluent.

con'genital (kən'dʒenitəl) – existing from birth, inborn.

con'gested (kən'dʒestid) – filled very full with; having more than the usual amount of blood in it, e.g. a swollen and inflamed part of the body is congested with blood.

con'glomerate (kən'glɔmərət) – brought together in a mass. **conglomerates** – rocks containing round stones set in the rocky mass.



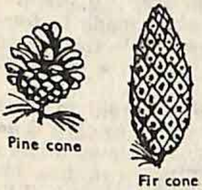
CONIC SECTIONS

'conic 'sections ('kɔnik -) –

curves obtained by cutting across a cone at various angles.

co'nidium (kə'nidiəm) – a dust-like spore, produced by many kinds of fungi, often formed at the end of a hypha (fungal thread) and never enclosed in a container.

Co'niferae (ko'nifərii) – trees which reproduce by means of cones, e.g. fir trees, pine trees. The flowers get pollen (male cells) with the help of the wind, and develop into cones containing fertilized seeds.

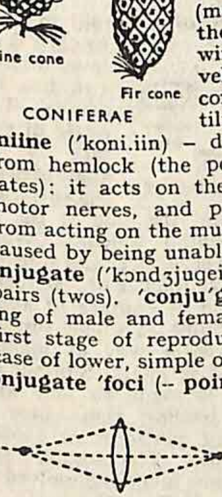


CONIFERAE

'coniine ('koni.iin) – drug obtained from hemlock (the poison of Socrates): it acts on the ends of the motor nerves, and prevents them from acting on the muscles; death is caused by being unable to breathe.

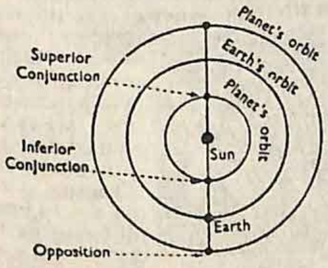
'conjugate ('kɔndʒjugeit) – joined in pairs (twos). **'conju'gation** – uniting of male and female cell in the first stage of reproduction (in the case of lower, simple organisms).

'conjugate 'foci (-- **points**) (of a lens or mirror) – two points such that, if light spreads out from one of them, it is brought to a focus (point) at the other.



CONJUGATE FOCI

con'junction, in (kən'jʌnkʃən) – A planet is in conjunction when a straight line from the Earth to the sun and a straight line from the Earth to the planet are in exactly the same direction; **superior conjunction** – when the planet is in line with the sun and beyond it; **inferior conjunction** – when the planet is between the Earth and the sun. (When the line to the sun and the line to the planet are in exactly opposite directions the planet is **in opposition**.)



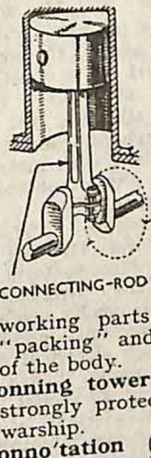
IN CONJUNCTION

'conjunc'tiva ('kɔndʒʌŋk'taivə) – the clear membrane over the eye-ball passing from the inner eyelid. **con'juncti'vitis** – inflammation of the conjunctiva.

con'junctive – joining together, e.g. **conjunctive 'paren'chyma** – tissue which serves as packing between other tissues in a plant or animal.

'connate water ('kɔneit -) – water which was originally in the substance of a rock when the rock was formed and has never been driven out.

co'nnecting-rod (kə'nektiŋ-) – rod joining the piston (moving inside the cylinder) to the ↓crank.



CONNECTING-ROD

co'nnective 'tissue – the cells of the body which join up, support, and protect the organs and other working parts of the body; the "packing" and "joining" substance of the body.

'conning tower ('kɔniŋ -) – raised, strongly protected deck-house in a warship.

'conno'tation ('kɔno'teiʃən) – the qualities thought of and the emotions felt when using a word: the **denotation** is the actual thing pointed out by the word, but the connotation is different when (e.g.) the word Communist is used by a person who believes, or does not believe, in Communism.

'consan'guinity ('kɔnsæŋ'gwiniti) – ("common-blood"): the state of being one of the same blood (family).

con'servancy system (kən'səəvənsi-)

– arrangement for carting away waste matter from a town.

'Conser'vation of Energy, Law of ('kɔnsə'veiʃən) – Energy cannot be made or destroyed; it can only be changed from one form into another form (e.g. from electricity into heat). **Conservation of Matter** – Matter is not made or destroyed in any chemical or other process (e.g. heating, magnetizing, etc.). But see Einstein relation.

Conservation of Mo'mentum (- mo'mentəm) – Momentum of a moving Body = its mass × its velocity (speed). If two Bodies act on each other (e.g. two moving Bodies hit each other) the total momentum after they have acted is the same as the total momentum before they acted. ↓recoil.

'console ('kɔnsoul) – a curved stone support; a table with one leg (or two) which stands against the wall; the part of a musical organ at which the player sits (the rest of the organ may be, perhaps, in another part of the hall); desk with instruments where a man sits to control a process from a distance.

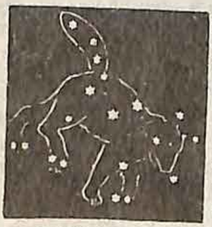
CONSOLE

'Constant of Gravi'tation – ↓G.

'Constant Pro'portions, Law of – When elements combine to form a certain compound, they always do so in the same proportions by weight.

'Constan'tan ('kɔnstən'tæn) – nickel-copper alloy of which electrical resistance wires are made: it has a high melting point: (trade name).

'conste'llation ('kɔnste'leiʃən) – a group of stars as thought of for naming, e.g. The Great Bear, Orion.



CONSTELLATION (Great Bear)

'consti'pation ('kɔnsti'peiʃən) – a state in which the bowels do not act often enough.

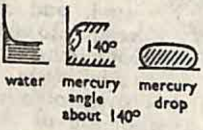
con'stituent (kəns'titjuənt) – ("standing together"): one of the substances used to make a certain mixture, e.g. zinc is a constituent of the alloy brass.

'consti'tution (chemical) ('kɔnsti'tjuuʃən) – the nature, number and arrangement of atoms in a molecule.

cons'triction (kəns'trikʃən) – sudden narrowing e.g. of a pipe.

'contact (electric) ('kɔntækt) – ("with-touch"): two surfaces (e.g. platinum points) which, when made to touch each other, allow an electric current to flow (e.g. as part of a telegraph-sending key).

contact, angle of – Liquid in a jar or tube is not level where it touches the sides. The angle of contact is the angle between the surface of the liquid and the side of the jar where the liquid touches. Water wets clean level surfaces and spreads; the angle of contact is 0°. Mercury, with an angle of contact of about 140°, forms drops on a level surface.



(ANGLE OF) CONTACT

contact process – way of making sulphuric acid (H_2SO_4). Sulphur dioxide (SO_2) is made to join with oxygen by passing them over a ↓catalyst (e.g. platinum or vanadium pentoxide). The sulphur trioxide (SO_3) thus made is dissolved in water; $SO_3 + H_2O \rightarrow H_2SO_4$.

con'tagious disease (kən'teidʒəs) – disease which is caught by touching a person; (an infectious disease may be carried by the air, or by water, or insects, etc.).

continental drift – ↓Wegener.

con'tinuous waves (kən'tinjuəs) – (radio): electric waves which are even all the way along and so carry no message. ↓modulation.

CONTOUR LINES

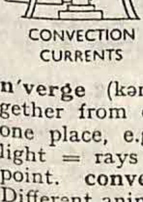
contour lines ('kɔntuə) – lines on a map joining different parts of the country which are at the same level. Similarly, lines on a map showing equal values of some other quantity, e.g. number of electrons in different parts of a crystal. **contour farming** – ploughing, etc., along lines of equal height instead of along straight lines.

con'tract (kən'trækt) – ("draw together"): become smaller and more tightly packed, e.g. leather contracts when it is boiled; air contracts when it is cooled; muscles contract when doing work. **con'tractile** (kən'træktail) – which contracts, e.g. **contractile vacuole** (- 'vækjuoul) – of ↓protozoa (simple, one-cell organisms), a part which contracts and so drives out waste matter.

'contra-ro'tating pro'pellers ('kɔntrə-ro'teitiŋ -) – two propellers going round in opposite directions one just behind the other. They do not make a single engine aeroplane tend to go over on the side (as does a single propeller), and the blades can be shorter than a single propeller so that the wheels of the ↓undercarriage can be smaller.

con'tusion (kɔn'tjuuʒən) – A bruise = damage to the tissues by a blow: a contusion = a bruise usually with some damage to the surface also.

con'vection of heat (kən'vekʃən -) – the carrying of heat from one part of a liquid or gas to another, e.g. by the rising of hot water and the sinking of cold water in a pot on the fire. **convector** – instrument for heating a room, not by heat rays, but by passing air over hot surfaces.



CONVECTION CURRENTS

con'verge (kən'vəədʒ) – come together from different directions to one place, e.g. converging rays of light = rays coming together to a point. **convergent 'evo'lution** – Different animals living in the same environment (surroundings) sometimes develop the same characters and so seem to develop in the same direction.

con'version (kən'vəəʃən) – changing into another form or direction, e.g. changing one radio wave to another radio wave of lower frequency.

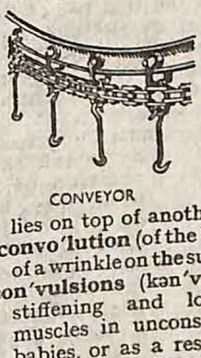
con'version hys'teria (- his'tiiəriə) – (medicine): a form of mental disorder caused by a conflict (= battle between opposite desires) in which the disorder of the mind is expressed in some disorder of the body, e.g. pain, blindness, etc. The disorder of the mind is converted (changed) into a disorder of the body.

con'vertiplane – an aircraft which acts as a ↓helicopter when taking off and landing but as a normal aeroplane when in flight (e.g. a ↓Rotodyne).

'convex lens ('kɔnveks) – lens thicker in the middle than at the edge. **convex mirror** – mirror with the centre curved forward from the edge.

CONVEX LENS

con'veyor (kən'veiə) – chain or surface moving along to carry parts or materials from one part of a factory to another.



CONVEYOR

'convolute ('kɔnvəljut) – rolled up so that one part lies on top of another.

'convo'lution (of the brain)–upper part of a wrinkle on the surface of the brain.

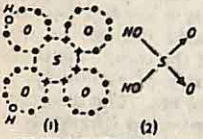
con'vulsions (kən'vʌlʃənz) – violent stiffening and loosening of the muscles in unconsciousness, e.g. in babies, or as a result of ↓epilepsy.

con'vulsion 'therapy (- 'θerəpi) – treatment of disorders of the mind by producing sudden unconsciousness and tightening of all the muscles by the use of a drug or (more usually) by electricity (= **electro-convulsion therapy**); used especially in ↓manic-depressive and ↓schizophrenic states.

'coolant ('kuulənt) – water, oil, etc., used to cool part of a machine.

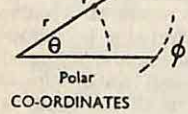
'Coolidge tube ('kuulidʒ -) – X-ray tube in which the electrons are produced from a heated cathode, e.g. a hot wire: (the electrons strike a metal block with a slanting face, so causing the block to send out X-rays). ↓ X-rays.

co-'ordinate 'link (kou'ɔɔdinət 'liŋk) – a join between atoms (in a molecule) formed by the sharing of electrons supplied by one of the atoms. Example: an oxygen atom has 6 electrons in the outer ring; a sulphur atom has 6 electrons in its outer ring. In compounds, atoms form rings of 8 electrons. Diagram (1) shows the SO_4 group of atoms in, e.g. sulphuric acid (H_2SO_4). The electrons marked x come from the sulphur atom, those marked ● come from the oxygen atoms, those marked O come from the hydrogen atoms. Notice that the sulphur atom and the oxygen atoms have rings of 8 and that two of the joins are formed by electrons supplied by sulphur atom only. These joins are co-ordinate joins. Diagram (2) shows the short way of writing such joins. ↓ co-valence.

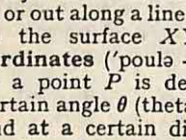


CO-ORDINATE LINKAGE

co-'ordinates (ko'ɔɔdinəts) – systems by which the position of a point may be described. **Car'tesian co-ordinates** (kaa'tiiziən) – The position of a point P is described as a certain distance away from the line Y and a certain distance away from the line X; also (for a solid) in or out along a line Z at right angles to the surface XY. **'Polar co-'ordinates** ('poulə -) – The position of a point P is described as at a certain angle θ (theta) to a fixed line, and at a certain distance, r, along the line of the angle. For solids the line may be swung, like a gun-barrel, through an angle ϕ (phi).



Cartesian



Polar

CO-ORDINATES

co-'ordi'nation – power of making the hands, legs, muscles of the body work together, as necessary in any skilful movement.

cop (kɔp) – spun cotton on a spindle (winding stick) as it comes from the spinning machine.

'copal ('koupəl) – tree gum used to make varnish. ↓ resin.

Co'pernican system (kɔ'pəənikən-) – In the Ptole'maic system it was believed that the sun and planets revolve round the Earth; Copernicus (1473–1543) taught that the Earth and the other planets revolve round the sun.

'coping ('koupiŋ) – top of a wall built so as to make rain flow off.

'coping-saw – thread-like blade in a square frame, like a ↓ fret-saw, but smaller.

co'planar forces (kou'pleinə -) – three or more forces acting in the same plane (flat surface).

'co'polymer ('kou'pɔlimə) – a plastic made by ↓ polymerizing two plastic-making substances (e.g. vinyl acetate and vinyl chloride) so as to get the good qualities of both, e.g. easy moulding *and* keeping its shape when moulded.

'copperas ('kɔpəræs) – crystalline iron sulphate; also called green copperas and green vitriol ('vitriɔl); blue copperas – copper sulphate; white copperas – zinc sulphate.

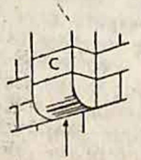
'copra ('kɔprə) – dried meat of the coconut.

copro-/ – faeces (the waste matter which passes out from the bowel): e.g. **'coprolite** ('kɔprəlait) – fossilized faeces used as fertilizer.

'copula ('kɔpjulə) – thing which joins two things together, e.g. two parts of a bridge. **copulation** (kɔpju'leiʃən) – sexual union.

corac-/ – beak-shaped, e.g. **'coracoid process** ('kɔrəkɔid -) – part of the shoulder bone shaped like a beak.

'corbel ('kɔɔbəl) – stone standing out from a wall to support the weight of an arch or carved figure.



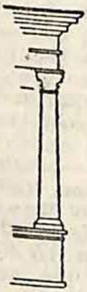
CORBEL

cord – measure of cut wood, 8×4×4 feet.

'cordite ('kɔɔdait) – explosive made from wood fibre, nitric acid and glycerine, used in rifles.

'corduroy ('kɔɔdjurɔi) – strong cotton material with lines of pile (upstanding threads) in it, used for working-clothes.

core (kɔɔ) – central part, e.g. of fruit where the seed is; iron bar in the centre of a coil-magnet; the nucleus and inner electrons of an atom; centre part of a mould which is taken out to leave the hole into which the melted metal is poured. **cores** (of a computer) – small rings of ↓ ferrite in the "memory" section which can be magnetized in two ways only – fully in one direction or fully in the other direction. (These two states of magnetization can represent the numbers 0 and 1 in the ↓ binary system of numbers.)



CORINTHIAN ARCHITECTURE

Co'rinthian 'architecture (kə'rinθiən-) – way of building with pillars as shown.

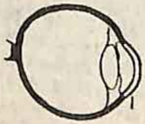
Corliss valve gear ('kɔɔlis -) – arrangement of four valves which lets steam in and out on each side of the piston, so that the piston is pushed in each direction; used on stationary (not moving) engines.

corm (kɔɔm) – a swelling of the stem formed by a plant under the ground (e.g. a crocus): this swelling is solid, not like a bulb made up of fleshy layers.

CROCUS CORM

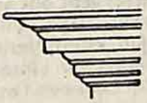
corn-/, corni-/, cornu- – horn, e.g. **cornute** – shaped like a horn.

'cornea (kɔɔniə) – the transparent outer layer of the front of the eye-ball.



CORNEA

'cornice ('kɔɔnis) – line of decoration (carved or moulded) along the top of a wall, inside or outside.



CORNICE

co'rolla (kə'rɔlə) – ring of petals round the seed-forming part of a flower; its use is to attract insects.

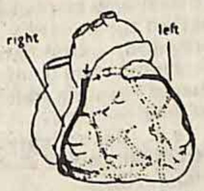
co'rollary (kə'rɔləri) – ("gift, money paid for a crown of flowers"): in mathematics, a truth which follows naturally from the proving of another truth – and so seems to come as a free gift.

COROLLA

co'rona (kə'rounə) – ("crown"): coloured ring round the sun or moon when seen through a mist; the sun's atmosphere, seen as a white glow during a total eclipse.

'coronary ('kɔrənəri) **circulation** – the blood supply of the heart itself.

'coronary throm'bosis (- θrɔm'bousis) – a small piece of solidified blood in the coronary artery of the heart.



CORONARY ARTERIES

'corpus ('kɔɔpəs) – body; **'corpora** – bodies.

'corpus ca'llosum (- kæ'lousəm) – the band of nerve fibres joining the two sides of the brain.

'corpus 'luteum (- 'ljutiəm) – yellow Body left on the surface of the ovary (organ in which ova (female cells) are formed). It remains in the case of pregnancy (child-bearing) and secretes (pours into the blood-stream) ↓ progesterone; it disappears if there is no pregnancy.

'corpus stri'atum (- strai'eitəm) – a mass of grey and white matter with coloured lines at the base of the brain; it has to do with control of the temperature of the body.

'corpuscle ('kɔɔpʌsəl) – a very small piece of substance, or a cell, e.g. blood corpuscles. **ˌcor'puscular theory of light** – the idea that light consists of small particles sent out at very high velocity (speed). ↓ photon.

corre'lation ('kɔrə'leiʃən, **coefficient of** – a figure which shows the closeness of the relationship between two sets of figures; e.g. if the boy whose marks are highest in Latin has also highest marks in French (and so on through the class) the coefficient of correlation is + 1; if highest in Latin is lowest in French (and so on) the coefficient of correlation is – 1. Part (but not exact) agreement is shown by a number between 0 and + 1; complete absence of agreement is shown by the number 0; part (but not exact) opposite agreement is shown by a number between 0 and – 1.

cor'rosion (kə'rouʒən) – eating away, e.g. of a metal by an acid. **corrosive sublimate** — mercuric chloride, $HgCl_2$, a poisonous substance used to kill bacteria; used also in photography to strengthen the picture.

'corrugated ('kɔrugeitid) – bent into waves, e.g. corrugated iron roofs. **corrugator muscle** – muscle which wrinkles the forehead.

/-cort-/ – shell, e.g. **decorticated** (nuts) – (nuts) from which the shell has been taken off.

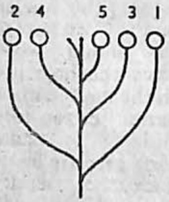
'cortex ('kɔɔteks) – outer shell, the part of a plant-stem between the skin and the wood in the middle. **cerebral cortex** – the outer (upper) layer of the brain. **cortical,** adj.

'Corti, organ of – that part of the spiral-shaped organ of the ear in which sound is changed into nervous impulses, so causing hearing.

'cortin – extract of the ↓ suprarenal gland used to cure Addison's disease (weakness, low blood-pressure, dark-coloured skin, wasting away, due to failure of the gland).

'corti'costerones – substances produced by the cortex (outer shell) of the ↓ suprarenal glands. **Des'oxy-'corti'costerone (des'oxy'cortone)** has a control over the proportion of sodium and water in the body, and is used in the treatment of Addison's disease. **'Corti'costerone** is a carbohydrate-regulating substance; it has a control over the use of sugar and other carbohydrates by the body. **'Cortisone** (hydroxydehydrocorticosterone. Compound E) has been used in the treatment of rheumatoid arthritis and certain other diseases.

co'rundum (kə'rʌndəm) – crystals of aluminium oxide used to make grind-stones for sharpening tools. It is the next hardest material after diamond. The crystal when coloured red by a chromium compound is the precious stone, ruby.



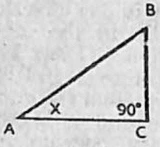
CORYMB

corymb ('kɔr-imb) – group of flowers shaped as shown, and opening in the order shown.

co'ryza (kə'raizə) – cold in the head.

cos – ↓ cosine.

'cosec, 'cosecant – of the angle X; the length of the line AB divided by the length of BC.

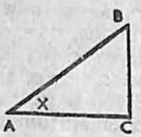


COSEC

co'settes (ko'sets) – thin pieces of cut sugar-beet (root grown for sugar); they are boiled to get out the sugar.

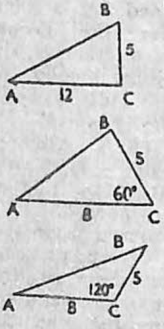
cosh – ↓ hyperbolic functions.

'cosine ('kousain) – of the angle X; the length of the side AC divided by the length of AB.



COSINE

cosine law – You have the triangle ABC, e.g. in drawing a map (↓ triangulation): you know the length of the sides AC and BC, and the angle C: you want the length of the side AB. If the angle C is a right angle, you know that $AB^2 = BC^2 + CA^2$, e.g. $AB^2 = 5^2 + 12^2 = 169$, and so $AB =$



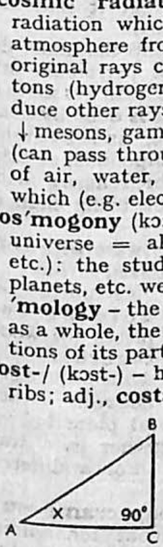
COSINE LAW

13 (↓ Pythagoras). The cosine rule enables you to make a similar calculation for *any* triangle. In *any* triangle, $AB^2 = BC^2 + CA^2 - 2BC.CA.\cos C$. If C is 90°, $\cos C = 0$. If C is less than a right angle, cos is +, e.g. $AB^2 = 8^2 + 5^2 - 2.8.5 \cos 60 = 64 + 25 - 2.8.5.(+\frac{1}{2}) = 49$; so $AB = 7$. If C is greater than a right angle, cos is − (minus), e.g. $AB^2 = 8^2 + 5^2 - 2.8.5. \cos 120 = 64 + 25 - 2.8.5.(-\frac{1}{2}) = 64 + 25 + 40 = 129$: so $AB = 11{\cdot}4$.

'cosmic radiation ('kɔzmik -) – radiation which enters the Earth's atmosphere from outer space. The original rays consist chiefly of protons (hydrogen nuclei); these produce other rays, some of which (e.g. ↓ mesons, gamma-rays) are "hard" (can pass through great thicknesses of air, water, rocks) and some of which (e.g. electrons) are "soft".

cos'mogony (kɔz'mɔgəni) – (*cosm-* = universe = all the stars, planets, etc.): the study of how the stars, planets, etc. were first formed. **cos'mology** – the study of the universe as a whole, the size, nature and relations of its parts.

cost-/ (kɔst-) – having to do with the ribs; adj., **costal.**



COTANGENT

cot, co'tangent (ko'tændʒənt) – of the angle X; the length of AC divided by the length of BC. **co'terminous** (ko'təəminəs) – having the same outer edges, the same boundaries.

'cotter ('kɔtə) – wedge, e.g. to prevent a wheel from slipping off its axle. **cotter pin** – a split pin, ∩-shaped, put through a hole in the cotter to prevent it from falling out; used also to prevent a nut from coming off, e.g. ↓ castle-nut.

cotter and pin

cotter pin

COTTER

coty'ledon ('kɔti'liidən) – leaf of the embryo (young plant) in a seed. **'monocoty'ledon** – a plant which has only one seed-leaf, e.g. grass.

'coulomb ('kuulɔm) – unit for measuring an amount of electricity, the amount which passes when one ampere flows for one second. In electrolysis one coulomb sets free 0·001118 gramme of silver. An electric iron uses about 200 coulombs per minute.

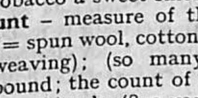
Coulomb's law – The force of attraction (or repulsion) between two electrically charged Bodies is proportional to the product of the charges and in opposite proportion to the distance between them squared (multiplied by itself). Example: Body A, charge 3 units; Body B, charge 4 units: distance between A and B = 5 cm.; the force

$$= \frac{3 \times 4}{5 \times 5} \text{ units (↓ dynes). If distance}$$

$$= 6 \text{ cms., force} = \frac{3 \times 4}{6 \times 6} \text{ units, and so}$$

on. **Coulomb barrier** – the electric repulsion between two like electric charges (e.g. between two similarly charged particles) which must be overcome if they are to come together. (French, 1736–1806.)

'coulter ('koultə) – The coulter cuts a line in the soil which is lifted and turned over by the plough-share.



COULTER

'coumarin ('kuumærin) – substance sometimes used to give tobacco a sweet smell.

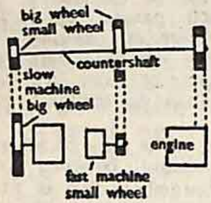
count – measure of the size of yarn (= spun wool, cotton, flax, as used in weaving); (so many) yards to a pound; the count of cotton = number of hanks (840 yard pieces) to the pound.

counter-/ ('kauntə-) – against, opposite to, e.g. **counter-clockwise** – in the opposite direction to that in which clock hands turn.

'counter-'irritant – ↓ irritant.

'counterpoise – weight used to balance another weight, e.g. on a bridge which swings up to let ships go below.

'countershaft (- ʃaaft) – instrument for producing speeds as needed. See picture: the engine turns a wheel on the countershaft and this turns a wheel on the machine, e.g. lathe. By using different-sized wheels on the countershaft different speeds can be obtained.



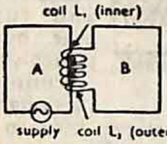
COUNTERSHAFT

'counter'sink – make a hole in (wood) so that the head of the screw goes down level with the surface.

couple (kʌpl) – join (two) things together so that they work together, e.g. the driving wheels of a railway engine; join together engine and carriages in a railway train.

couple – (mechanics) – two equal parallel forces pulling in opposite directions on a bar, wheel, etc. The couple causes the bar (wheel) to turn.

coupled circuits – two electric circuits arranged so that some of the electrical energy supplied to one circuit is transferred (carried over) to the other circuit. The picture shows **transformer coupling.** The first circuit A has in it a coil L_1. The second circuit has a coil L_2 which is round the outside of L_1. If an alternating current is made to flow in the circuit A, an alternating current is induced (caused to flow) in circuit B.



TRANSFORMER COUPLING

course – layer of bricks in a wall.

co'valency ('kou'veilənsi) – joining together of two atoms by sharing two electrons. Usually one electron is supplied by each atom, but both may be supplied by one atom. ↓ co-ordinate.

cowl (kaul) – covering, e.g. iron top to a chimney to prevent the wind from blowing down into the chimney; covering of an aeroplane engine.

cowpox – disease affecting the milk-organs of cows, caused by a ↓ virus similar to that which causes smallpox in man. Also called **vaccinia**. ↓ vaccine.

'coxa ('kɔksə) – the upper joint of the leg, the hip bone. **coxa valga** (vælgə) – having an angle of more than 140° between the neck of the bone and the lower part of the bone so that the leg is bent outwards. **coxa vara** ('veərə) – with the said angle less than 120° so that the leg is bent inwards.

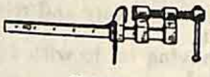
Cr – chemical sign for ↓ chromium.

'crabbing – steaming and stretching woollen cloth so that it may not wrinkle when finished.

cracking – breaking up the molecules of heavier parts of petroleum into lighter molecules so as to get more of the lighter oils: this is done by heating under pressure, and by using silicates (silicon compounds) as catalysts (substances which cause a chemical change without being changed themselves).

crackle ware–pottery (ware) with many small cracks in the glazed surface.

cramp (kræmp) – instrument for holding two pieces (of wood) together, e.g. while the glue between them solidifies; bent metal piece holding building-stones together in a wall, also called clamp. For a different kind, ↓ clamp.

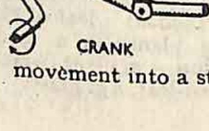


CRAMP

'crampon ('kræmpɔn), **crampoon** – scissor-like instrument for holding stones when they are being pulled up by a crane.

'cranium ('kreiniəm) – the bony container of the brain, the skull. **cranio-/** – having to do with the cranium, e.g. **crani'otomy** – cutting or breaking the skull as in very difficult child-birth.

crank – bar as shown, used for changing a straight up-and-down (or in-and-out) movement in to a circular movement, – or a circular movement into a straight one.



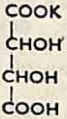
CRANK

crash ('kræʃ) – coarse linen cloth.

'crazing ('kreiziŋ) – breaking up the surface into very fine cracks, e.g. of plaster, of cement, of the glaze of pottery.

cream-laid ('kriim 'leid) – white letter paper with a watermark of parallel lines: the watermark is made by the wires on which the wet material is laid in making the paper.

'cream of 'tartar – acid potassium tartrate, obtained in making wine, used for baking-powder for cakes.



$$\begin{array}{c} COOK \\ | \\ CHOH \\ | \\ CHOH \\ | \\ COOH \end{array}$$

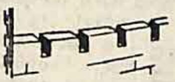
CREAM OF TARTAR

creatine ('kriiətiin) – (*creat-* = meat): substance contained in muscle and broken down in the process of muscular work.

creep – slow movement, e.g. of metals losing shape owing to continuous pressure or pull.

'crenate ('kriineit) – (leaves, etc.): having an irregular edge like teeth.

'crenellated ('krenəleitid) – shaped like the top of a castle wall.



CRENELLATED

'creosote ('kriiəsout) – brown liquid obtained from coal-tar, used to preserve wood.

crêpe (kreip) – dress material (of silk or cotton) having a rough surface. **crêpe rubber** – natural (unmanufactured) rubber pressed into blocks with a wrinkled surface.

'crepi'tation ('krepi'teiʃən), **'crepitus** ('krepitəs) – slight sound or rough feeling, e.g. when two broken ends of a bone rub together; slight rubbing sound heard in the chest (as of rubbing one's hair near one's ear).

cre'puscular (kre'pʌskiulə) – seen or active in the faint light just at sunset and sunrise, at dusk or dawn.

'crescents ('kresənts) – sex cells of malignant (more serious form of) malaria.

'cresol ('kriisɔl) – $CH_3.C_6H_4.OH$, colourless liquid or crystals obtained from coal-tar; used to make the antiseptic "Lysol", also (mixed with an earth) to make (wrongly named) "Carbolic powder". Also used in the making of certain dyes, explosives and plastics.

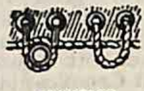
cre'taceous (krii'teiʃiəs) – containing or made of chalk. **Cretaceous period** – about 140–70 million years ago when the chalk-rocks were formed.

cretin ('kretin) – person not properly developed owing to weakness of ↓ thyroid gland.

cribei/-, cribri-/- (krib-) – sieve-like, like a container with small holes in the bottom to separate small from larger particles, e.g. **'cribriform. cri'bellum** – plate with holes in it through which a spider draws out its thread.

'cricoid ('kraikɔid) – ring-shaped, e.g. the **cricoid cartilage** in the throat just below the outstanding point (Adam's apple) in the neck. For picture ↓ larynx.

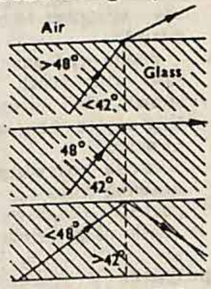
'cringles (kriŋglz) – metal rings set in a rope along the edge of a sail.



CRINGLES

'crisis ('kraisis) – (medical): sudden quick fall of temperature at the end of a fever.

'critical angle ('kritikəl -) – Light is passing from a dense substance, (e.g. glass) into a less dense substance (e.g. air): if the angle between the ray and the surface is less than a certain angle (48° for glass) the ray does not pass out but is wholly reflected back. It is more usual to consider the angle between the ray and a line at right angles to the surface. Reflection takes place if this angle is more than a certain angle (42° for glass), called the critical angle.



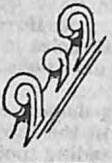
CRITICAL ANGLE

critical mass – the mass of uranium

or of plutonium which is big enough to produce a self-sustaining ↓ chain reaction. (Bombs are of supercritical mass.)

critical pressure – the pressure at which a gas can be liquefied if it is cooled to its **critical temperature.** If a gas is hotter than this temperature it cannot be liquefied by any amount of pressure. **critical state** (of a substance) – just between being a liquid and being a gas.

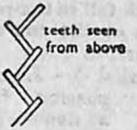
'crockets ('krɔkits) – small ornamental carvings at regular spaces along the edge of a roof or window (etc.).



CROCKETS

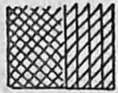
Cro'magnon man (krou'mæniɔn) – remains found in France of a kind of man who lived about 40,000 to 25,000 years ago. He made good stone tools, and drew pictures on the walls of caves. (Present-day man is not descended from him.)

Crookes tube ('kruks -) – glass tube, with very low gas pressure, through which electricity is passed. The tube shines with a green light. **Crookes glass** – glass which keeps out heat-rays while letting through light rays. (English, 1832–1919.)



CROSS CUT SAW

cross-cut saw – saw with teeth as shown, used for cutting across the grain of wood.

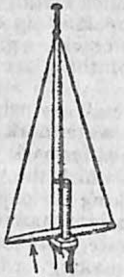


CROSS HATCHING

cross-hatching – drawing lines across part of a diagram to show that it is made of a different material.

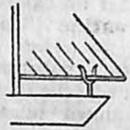
cross-linked polymer – substance (↓ polymer), consisting of long-chained molecules which can be hardened (or otherwise changed) by causing cross-joins to form between the molecules.

cross-section – (1) drawing of a thing as seen if cut across. (2) the effective size of the nucleus of an atom in nuclear reactions, e.g. in absorbing neutrons. (If the cross-section is large, neutrons have a better chance of being absorbed than if it is small.)



CROSSTREES

'crosstrees – cross pieces at the upper part of a mast, at right angles to the length of the ship, used to hold out the ropes or wires which hold up the top part of the mast.



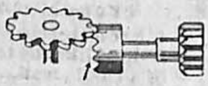
CROTCH

crotch, crutch – Y-shaped support, e.g. for the boom (bottom bar of sail).

crown glass – glass made of soda, lime and sand; it is less easily melted than ordinary glass, used e.g. for electric bulbs.

crown oc'tavo - (ɔk'teivou) – a piece of paper 15 × 20 inches (= crown) folded to make 8 leaves 7½ × 5.

crown wheel – wheel with teeth cut round its side (i.e. out from its flat surface), e.g. as part of the winding of a watch. Also see differential.



CROWN WHEEL

cruc-/ – cross, e.g. **'cruciform** ('kruusifɔɔm) – shaped like a cross.

'crucible ('kruusibl) – container in which metals are melted.

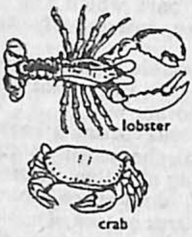
Cru'ciferae (kruu'sifərii) – plants of the wallflower, cabbage family, each flower having 4 petals.

CRUCIFERAE
(wall-flower)

crude (kruud) – in its natural state, not purified, e.g. crude petroleum.

'cruising speed ('kruuziŋ) – of an aeroplane, ordinary travelling speed, about 90 per cent of what it is designed to do.

Crus'tacea (krʌs'teiʃiə) – shell-creatures of the same family as prawns, lobsters, crabs; they have jointed limbs, and the head and thorax (chest) are covered with a shell.



CRUSTACEA

crutch – the hollow between the legs where they join the body; Y-shaped support; part of clock which touches the pendulum on each side and makes it swing.

cryo-/ (kraio-) – having to do with ice; e.g. **'cryo'genic technique** – ways of freezing, ways of getting very low temperatures.

'cryolite ('kraiolait) – white ice-like mineral found in ↓granite rocks; used to make glass cloudy. Used in making aluminium: (aluminium oxide is dissolved in melted cryolite when separating the oxygen from it (by electricity) to get the metal).

crypt-/- (kript) – hidden. **'cryptogam** – ("hidden marry"): plant which never produces flowers, e.g. moss, fern. **'cryptomere** – a character which is inherited but is not seen, e.g. the blue-eyed character in a person whose eyes are dark (but the children may, in certain cases, be blue- or grey-eyed). **'crypto'zoite** (-zouait) – form of malarial parasite which from bite of mosquito till 9th day remains in the liver where it divides into ↓merozoites which pass into the blood.

'crystal (kristəl) – regular arrangement of atoms or ions in a pattern as in solid grains of sugar, salt, etc. **crystalline** ('kristəlain) – adj.

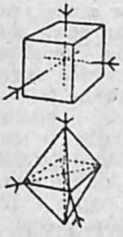
Cs – chemical sign for ↓caesium.

cten-/ – like a comb, e.g. **c'tenoid** (k'tiinɔid) – shaped like a comb.

Cu – chemical sign for copper.

cube (kjuub) – solid square. **cubed** – multiplied by itself twice, e.g. 3^3 = three cubed = 3 × 3 × 3. **cubic foot** – space 1 ft. high, wide and thick. **cube root** – e.g. the cube root of 64 (written $\sqrt[3]{64}$) = 4; (4 × 4 × 4 = 64).

cubic system of crystals – A crystal of this shape has three equal axes (middle lines). If the crystal is turned on any axis, there are four positions in a whole turn such that corners, edges and faces come into the same positions. Examples: rock-salt, diamond.



CUBIC

Culex ('kjuuleks) – mosquitoes.

'cullet (kʌlit)–waste glass melted again with the other materials in making new glass.

culm (kʌlm) – stem of a plant with joints where the leaves grow out, as in grass.

'cultivator – instrument with strong curved teeth on springs, pulled over the ground to break it up into a fine powder; toothed hand-tool of the same kind.

CULTIVATOR

'culture ('kʌltʃə) – bacteria (etc.) growing on or in a substance which gives them the necessary food.

'culvert (kʌlvət) – arched way or big pipe to allow a stream to flow across (e.g. under) a road (etc.).

/-'cumbent (-'kʌmbənt) – lying, e.g. **pro'cumbent** (of a plant) – lying forward with its stem on the ground; **re'cumbent** – lying on its back.

cumulo-'nimbus ('kjuumjulo-nimbəs – masses of piled-up cloud, thunder clouds.

CUMULUS

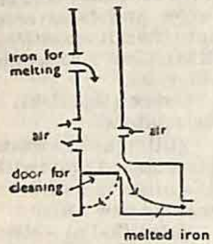
cumulus ('kjuumjuləs) – thick cloud with a clearly shaped upper edge.

'cuneus ('kjuunjəs)– wedge. **'cuneate, 'cuniform** – wedge-shaped.

'cupel ('kjuupəl) – container made of bone-ash used in testing metals for gold or silver. **'cupel'lation** = ↓assay.

CUPOLA

'cupola ('kjuupələ) – a small rounded roof, a small dome, usually one supported on pillars or arches, not set down onto the building.



CUPOLA FURNACE

cupola furnace – furnace for melting iron which has a circular (domed) roof.

cupr-/- (kj-uupr-)–copper, of copper. **'cupric, 'cuprous** (↓/-ic, -ous).

cu'rare, curari (kju'raari) – poison (obtained from the same plant-group as is ↓strychnine); it so affects nerve endings that there is loss of power and loosening of the *skeletal muscles; used to relax (loosen) the muscles in surgery. *(Muscles which are joined to bones.)

CURARE

curb pins – pins which shorten (or lengthen) the ↓hair-spring to make a watch go faster (or slower).

cure (kjuə) – prepare (leather, tobacco, etc.) for use by treating with chemicals or heat (etc.).

cu'rette (kju'ret) – spoon-shaped surgical instrument for clearing out matter from a hollow space.

'curie ('kjuuri) – unit for measuring an amount of a radioactive substance.

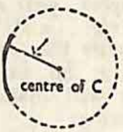
'Curie point ('kjuuri -) – temperature at which a magnetized metal ceases to be a magnet, e.g. nickel at 358° C. (Polish, 1867–1934.)

'current ('kʌrənt) – flow of water in one direction, e.g. in a river; flow of electricity along a wire. **direct current** – electric flow in one direction. **alternating current** – flow first in one and then in the other direction, about 50 cycles a second in ordinary house-supply.

curs-/ (kəəs-) – run, e.g. **cur'sores** (kəə'sɔɔriiz) – birds which run, e.g. ostrich.

cursor ('kəəsə) – part which can be moved along an instrument, e.g. ↓slide rule.

curtain wall – outside wall carrying no weight, built on a beam (not over another wall).

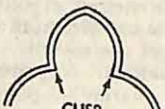


CURVATURE

'curvature ('kəəvətʃə)–the measure of curving of a line. **centre of curvature** (of a mirror or face of a lens) – the centre of the sphere (ball) of which the mirror (lens-face) is a part. **radius of curvature** – the radius of this sphere.

cusec ('kjuusek) – cubic foot per second, as a measure of flow of water.

cusp (kʌsp) – pointed part outstanding, e.g., from a tooth; the meeting point of two curves, e.g. arches or tracery (stone-work in church window.)



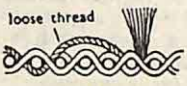
CUSP

cu'taneous (kju'teiniəs) – of the skin.

'cuticle (kj'uutikl) – (1) waterproof outer layer of skin on a leaf; (2) narrow line of skin seen round the inner edge of the finger-nail.

cut-out – instrument which, under certain conditions, automatically opens an electric circuit and so shuts off an electric current.

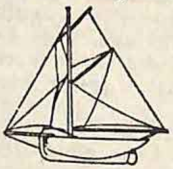
cut-pile (-pail) – way of weaving velvet and plush: the cloth is woven with loops standing up from the surface; these are then cut open.



CUT PILE

cut-spirits – (whisky, brandy, etc.) with water added to make it weaker; so also **cut paint** – paint with liquid added.

'cutter – sailing boat with one mast with fore and aft (longways) sails; it has two fore-sails.



CUTTER

'cyan ('saiæn) – special blue-green

colour, one of the three colours into which light is divided in colour photography; cyan = white light from which red has been taken out = "minus-red".

cyan-/ – (1) dark blue; (2) (*chemistry*) containing or related to the cyanide group –CN.

cy'anamide (sai'ænəmaid) – fertilizer which supplies lime and nitrogen to the soil.

'cyanates ('saiəneitz) – salts of cyanic acid, e.g. potassium cyanate, KCNO.

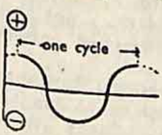
'cyanide ('saiənaid) – salt of hydrocyanic acid (HCN), e.g. potassium cyanide, KCN; cyanides are used in silver-plating and in separating gold from ore, etc.: poisonous.

cyanide hardening – hardening the surface of steel (as in ↓case hardening) with melted sodium cyanide; the surface of the steel combines with more carbon.

'cya'nosis ('saiə'nousis) – blueness, especially of the face, due to lack of oxygen in the blood.

'cyber'netics ('saibə'netiks) – the study and theory of instruments which automatically control the working of a machine, e.g. a "robot" pilot for controlling the flight of an aeroplane. Also applied to the working of living things, e.g. to the human brain.

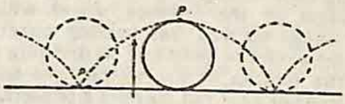
cycle (saikl) – one complete set of events which happens again and again, e.g. ↓carbon cycle, Carnot cycle, etc. (*Electricity*) – one complete set of changes in alternating current from greatest positive to greatest negative current and back again (⊕ to ⊖ and ⊖ to ⊕). (*Astronomy*) – time at the end of which a certain set of stars (etc.) is seen again in the same position.



CYCLE

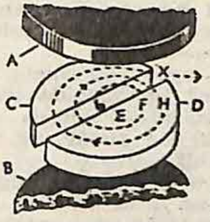
'cyclic 'compounds ('saiklik -) – chemical compounds made up of one or more rings of (mostly) carbon atoms, e.g. ↓benzene, pyridine.

'cyclo-/ (saiklo -) – circle. **'cycloid curve** – the curve produced by a point on a circle rolling (without slipping) on a straight line. ↓hypocycloid, ↓epicycloid.



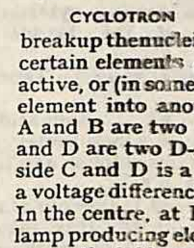
CYCLOID CURVE

'cyclo'thymia ('saiklo'θaimiə) – disorder of the mind causing great excitement, then the opposite (depression, grief, loss of hope, etc.), then excitement . . . and so on, as in a circle.



CYCLOTRON

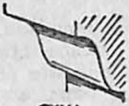
'cyclotron ('saiklotrɔn) – an instrument for producing heavy electric particles (e.g. ↓alpha particles) moving at a very high speed; these are used to break up the nuclei of atoms, so making certain elements (e.g. sodium) radioactive, or (in some cases) changing one element into another. See diagram. A and B are two electromagnets. C and D are two D-shaped boxes. Inside C and D is a vacuum. There is a voltage difference between C and D. In the centre, at E, is a special arc-lamp producing electric particles. The magnetic field causes the particles to travel round from E to F. When they get to F the voltage is changed round the other way. This causes the particles to swing round still faster into box C; then back to H. The particles travel faster and faster in a spiral, until at X they are turned outwards (by an electrically charged plate).



CYLINDER

'cylinder ('silində) – a solid as shown; part of an engine as shown (by dotted line)

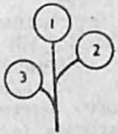
cylinder es'capement of a watch – The teeth on the escape wheel stand up from its edge; there is a ring on the stem of the balance wheel which swings to and fro, passing over or between the teeth and so dividing up the motion of the watch into fractions of a second (as does a pendulum in a clock). The ↓lever escapement is more usual.



CYMA

'cyma ('saimə) – S-shaped surface on wood, plaster, stone.

cyme (saim) – group of flowers on a plant, opening in the order shown.



CYME

'cyno-/- ('saino-) – dog, e.g. **Cy'noidae** (sai'noidii) – animals of the dog family, e.g. a wolf.

cyst-/ – having to do with the bladder (organ in which urine collects), or with the ↓gall-bladder; e.g. **cystitis** – inflammation of the bladder (urinary-).

'cysticer'cosis ('sistisə'kousis) – Tape worm disease.

'cystine (sistiin) – an ↓amino-acid (one of the acids of which proteins consist). It contains sulphur and is specially common in hair.

cysts (sists) – enclosed hollows in the body, containing liquid; they may be caused by stopping the outflow of a liquid, e.g. of sweat or milk. Another kind is caused by folding in of the skin in the earliest development of the child so that it encloses other matter, e.g. hair or fat, as in a bag.

cyto-/ – cell, e.g. **cy'tology** (sai'tɔlədʒi) – the study of the cells of which a living body is built. **'cytoplasm** ('saitoplæzm) – the protoplasm of a cell other than the nucleus (centre part).

D

D – chemical sign for ↓deuterium.

D, d; *Δ, δ* – ↓derivative.

D.A.H. – disordered action of the heart. ↓effort syndrome.

D.C. – ↓direct current. **D.C. restorer** – part of a television circuit which controls the average brightness of the picture, e.g. shows the difference between a fully lit room and same room with the light turned down low.

D.D.T. – substance used to kill insects. Its full name is *D*ichloro-*D*iphenyl-*T*richloroethane. It acts on the nervous system, and is one of the most powerful insect-killers known. Also called **'Dicophane.**

D layer – a layer in the atmosphere which at the time of sunspots stops short-wave radio; it is about 50–60 miles up.

D light – orange-yellow light from sodium (e.g. from common salt in a flame).

D.M.P. – ↓*D*i*M*ethyl*P*hthalate.

D.N.A. – ↓desoxyribonucleic acid.

Δ, δ – Greek letter D, ↓**'delta.** ↓derivative.

'dacryo-/ ('dækrio-) – tear, e.g. **'dacryocys'titis** – inflammation of the passage which carries tears away from the eye into the nose.

/-'dactyl-/ ('dæktil-) – finger, or toe, e.g. **'poly'dactylism** – state of having more than ten fingers.

'dado ('deidou) – line of paint or other decoration round the lower part of the wall of a room.

'Dakin's so'lution ('deikinz -) – antiseptic which sets free chlorine (sodium hypochlorite, NaClO).

'Daltonism ('dɔ́ɔltənizm) – not being able to see the difference between red and green.

'Dalton's atómic theory ('dɔɔltənz) – Matter is made up of atoms: the atoms of any one element are the same; atoms attract each other and combine in certain fixed simple proportions (not in halves or quarters, etc.).

'Dalton's law of partial pressures – In a mixture of gases the pressure of each gas is that which it would have if it filled all the space. The pressure of a mixture of gases (gases A, B, C . . .) is the pressure of A + pressure of B + pressure of C (as if each filled all the space).

'damascene(-k-) ('dæməsiin) – to ornament metal (e.g. steel) by hammering in lines of other metal, or by hammering together separate bars of steel into one piece so as to show wavy lines.

'damask ('dæməsk) – cotton, silk or linen with a pattern woven into it, e.g. a linen table-cloth.

damp – gas in a coal-mine.

damper – plate across a chimney used to allow less or more air-flow from the fire up the chimney.

damping (vibrations, pendulum, etc.) – causing to vibrate less freely and less widely.

damping down a fire – covering with wet powdered coal to make it burn more slowly.

damping-off – disease of young plants due to a fungus which causes them to decay and die if kept in a cold wet place.

damp-proof course – layer of waterproof material in a wall to prevent moisture from coming up through the bricks.

'dandy roll ('dændi) – roller made of woven wire which makes the watermark on machine-made paper.

'Daniell cell ('dæniəl -) – electric cell made of zinc in zinc sulphate solution (or weak sulphuric acid) and copper in copper sulphate solution; the electricity flows round the circuit from the copper to the zinc.

dark-slide – box with a sliding front in which a photographic glass plate or film is put into a camera.

Dar'winian theory (daa'winiən) – The offspring of all creatures are slightly different from parents. Those offspring live whose differences best suit their surroundings; the others die (or do not have young); so the shape and character of the species (kind of creature) slowly changes to suit its surroundings. (English 1809–1882.)

DARWIN'S TUBERCLE

Darwin's 'tubercle (- 'tiubəkl) – point at the top of the ear, small in man, larger in monkeys.

dasy-/ (dæsi-) – hairy, covered with soft hair, e.g. **da'syphyllous** (dæ'sifiləs) – with hairy leaves, or close-set small leaves like hair.

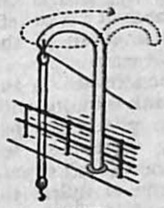
date line – A traveller going eastwards round the world gains time: a westwards traveller loses time. So it is arranged that on the "date line" (roughly 180° from Greenwich) the eastward traveller calls two days by the same date and the westward traveller misses out a day.

'datum ('deitəm) – ("given"): thing taken as the starting point of a piece of reasoning or scientific enquiry, plural, **'data. datum line** – place at sea-level from which depth of valleys and height of hills are measured. (The British datum line is at Newlyn, Cornwall.)

(Siebe. Gorman & Co. Ltd.)

DAVIS APPARATUS

'Davis appa'ratus ('deivis) – instrument used to give air to a person coming up out of deep water, e.g. from a sunken submarine; it also carries him up through the water.



DAVIT

'davits ('dævits) – curved bars used to lower a boat over the side of a ship or to pull it up.

Davy safety lamp ('deivi -) – lamp used by miners to prevent the lamp-flame from setting fire to gas in a mine. The flame is enclosed in wire gauze (woven wire) so that the gauze carries away the heat of the lamp's flame, and makes it impossible for it to set fire to gas outside. Also used to test for gas in a mine (the flame becomes blue). (English, 1778–1829.)

DAVY LAMP

Db – sign for ↓ decibel.

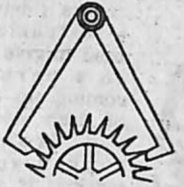
de-/ (dii-) – (1) cause

not to be, e.g. **de'activate** – cause not to be active. **de'carbonize** – take away the hard layer of carbon from the inside of a used motor-car engine. **de'magnetize** – cause to cease to be a magnet. **de'odorize** (dii'oudəraiz) – cause not to have an odour (smell). **de'oxidize** (dii'ɔksidaiz) – remove oxygen from.
(2) down, e.g. ↓ depression.

dead angle – angle at which the inlet valves of a steam engine are closed so that the engine will not start unless the wheel is moved a little.

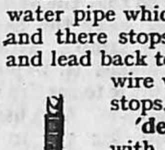
dead axle – axle which does not turn round with the wheels.

dead-beat – instrument in which a part does not recoil (bounce back) or swing to and fro but goes straight into its position and stays there, e.g. **dead-beat escapement** (of clock) – ↓ escape-wheel of a clock which goes round one tooth at a time and does not recoil from the pallets (the two teeth which control it); this is because the inner surfaces of the pallets are so shaped that a tooth of the wheel touches all the way.



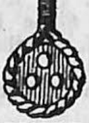
DEAD-BEAT ESCAPEMENT

dead centre – position in which the crank is in line with the piston so that the force of the steam (etc.) cannot move it unless the crank is turned a little up or down.



DEAD CENTRE.

dead-end – a piece of (e.g.) hot-water pipe which leads out to a tap and there stops; it does not go on and lead back to the cistern; so also wire which leads out, and stops.



DEADEYE

'deadeyes – blocks with three holes: one rope from the mast goes round the deadeye: another rope goes round another deadeye fixed to the ship's side: the mast rope is tightened by pulling the two deadeyes together. ↓ bottle-screw (often used instead of deadeyes).

dead-head – block of wood tied to an anchor which shows where it is in the water.

'dead-lights – wooden covers over ship's windows used in bad weather.

dead load – the weight which is always carried by (e.g.) a bridge – that is, the weight of the bridge itself.

dead man's handle – If the driver of an electric train ceases to press on this handle the train stops; so if the driver falls ill or dies while driving, the train stops.

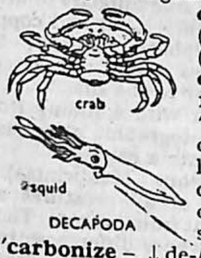
dead reckoning – calculation of the position of a ship or aeroplane from the speed and time from its last known position.

dead weight – ↓ dead load.

deal (diil) – (1) softwood, e.g. pine or fir; (2) a piece of wood (usually softwood) cut to a width of about 10 inches and over 2 inches thick.

de'bridement (de'briidmən) – cutting away all dead tissue (skin, etc.) from a wound so as to leave healthy surfaces to grow together.

dec- (des-), **deca-** (dekə-), **decem-/** (desem-) – 10, e.g. **decade** ('dekəd) 10–years. **'Deca'poda** (-'poudə) – creatures with 10 legs, e.g. crabs, or 10 arms, e.g. cuttlefish. Also see deci-/.



DECAPODA

de'carbonize – ↓ de-/.

'Decca – system of radio-navigation. (trade name.)

de'celeration (dii'selə-) – rate of becoming slower (opposite of acceleration).

'deci-/ ('desi-) – one-tenth, e.g. **'decibel** – one-tenth of a bel, a unit used to describe how many times one sound is more powerful than another, e.g. if sound A is 2 bels more powerful than sound B, it is 10^2 (10 × 10) times stronger; 1 decibel more powerful means $10^{0\cdot1}$ (1·259) times more powerful. ↓ phon.

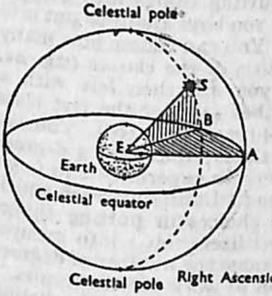
de′cidua (de′sidjuə) – those parts of the mother which are passed out after the birth of young.

deciduous (trees) – which lose their leaves in winter.

′deciles (′desailz) – similar to ↓quartiles, but dividing the measures into 10 groups, 1st tenth of the measures, 2nd tenth, etc.

deckle edge (dekl -) – rough edge of paper as if torn. (The deckle is the frame on which the paper is made and the raised wires on it produce the watermark.)

declination (′dekli′neiʃən) – the distance of a star north or south of the celestial equator (see diagram). Declination is stated as an angle, or as hours, minutes, seconds. Compare the latitude of a place on the Earth.



Right Ascension – angle AEB

Declination – angle BES

DECLINATION

declination of a compass – angle of compass needle from True north.

de′coction (di′kɔkʃən) – liquid got from boiling vegetable substances in water for use as a medicine.

′decompo′sition (′diikɔmpə′ziʃən) – breaking down of a complex chemical substance into simpler substances.

′decom′pression (′diikəm′preʃən) – lessening of pressure, e.g. pressure on the body when going high up in an aeroplane or coming up from deep in the sea; it is likely to cause ↓bends unless done slowly; (*of the brain*) – cutting a hole in the skull so as to lessen pressure on the brain, e.g. by taking out liquid (cerebro-spinal fluid).

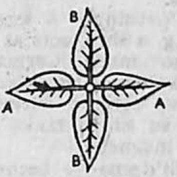
′de′corticated (′dii′kɔɔti-) – from which the outer shell has been taken, e.g. decorticated nuts – nuts from which the shell has been taken off.

′decrement (′dekrimənt) – amount by which a thing becomes less; (opposite of increment).

de′cubitus (dii′kjuubitəs) – position of a person lying in bed (in an unconscious person this is often a sign showing where the pain or injury is).

decumbent (dii′kʌmbənt) – lying down.

′decus′sation (′diikʌs-) – crossing over, e.g. of nerves.



DECUSSATE

(arrangement of leaves seen from above)

decussate arrangement of leaves – leaves in pairs on a plant, each pair at right angles to the other pair, as shown.

de′dendum –(di′dendəm)– lower part of a gear tooth. ↓pitch circle.

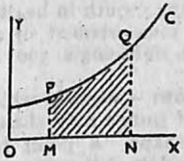
deeps – ↓lead-line.

′defae′cation (′diifi-) – medical word for dropping waste matter (faeces) from the bowel (as in the lavatory): also spelt **defecation, feces** (U.S.A.).

′defer′vescence (′diifəə′vesəns) – fall of temperature, e.g. after fever, down to normal.

de′ficiency disease (di′fiʃənsi -) – illness caused by not having some necessary substance in the food, e.g. no fresh fruit caused scurvy in seamen, because of the lack of the ↓vitamins contained in fruit; so also ↓rickets, beriberi.

′definite ′integral – By means of integral ↓calculus we can work out such problems as: What is the area between the curve *C* and the straight line *OX*? The answer is an indefinite integral because we have not said how far to the left and right the area is to reach. If we say a definite area,



DEFINITE INTEGRAL

e.g. from *PM* to *QN*, the answer is a definite integral.

defi'nition (photography) – A picture has good definition if it shows all the details clearly.

'deflagrate ('diiflægreit) – suddenly catch fire and burn fiercely.

de'flect (dii'flekt) – bend away, cause the needle of an instrument to move to one side.

'defor'mation ('diifɔɔ-) – change of shape in a part (e.g. of engine, bridge, frame, etc.) due to pushing and pulling forces.

'de'gaussing ('dii'gausiŋ) – A large mass of metal, e.g. a ship, acts as a magnet (and so made German magnetic mines explode). Degaussing means passing an electric current round the ship so as to make it cease to act as a magnet.

de'gene'ration (dii'dʒenə-) – becoming less strong, less able to do its work, e.g. fatty degeneration of the liver; (of an organism) opposite of evolution – becoming less complicated, less able to deal with a complicated form of life, e.g. many parasites were originally complicated and free-living organisms.

'deglu'tition ('diiglu'tiʃən) – swallowing (food, etc.).

'degra'dation ('degrə'dei-) – breaking up of a complex substance into a simpler one, e.g. when a plastic boils, its long chains of molecules break up into a number of simple, unchained molecules.

de'gras (de'graa) – fat extract from sheepskins; also called **'moellen** ('moələn).

de'gree (di'grii) – a step on a measuring scale or instrument, e.g. 98·4° F. (° = degrees, F = Fahrenheit), the temperature of the mouth in health. A unit for the measurement of an angle; 90° = one right angle, 360° = a whole circle.

degrees of freedom – ways in which a thing or set of things may change in position or shape. A point has 3 degrees of freedom – it can move (1) up and down, (2) sideways, (3) backwards and forwards. A firm solid thing usually has 6 degrees of freedom: it can move in the above 3 ways and turn on its point of balance upwards, across, and inwards. There are other degrees of freedom if parts of the thing can vibrate in and out. ↓equipartition of energy. See also below.

degrees of freedom (*chemistry*) – the number of different things (e.g. pressure, temperature . . . .) which must be known before the state of a gas, a liquid, or a solid can be exactly described; e.g. a certain amount (mass) of gas has 2 degrees of freedom because to describe it we must tell (1) its pressure and (2) its temperature. ↓phase rule.

degrees of freedom (*statistics*) – the number of free choices which you have in putting things into groups. Example: 100 boys are to be put into 4 classes. You can choose how many to put into 3 of the classes (e.g. 22, 31, 17); you are then left with a fixed number (30) for the last class $(22 + 31 + 17 + 30 = 100)$. You can choose 3 times; there are 3 degrees of freedom. In experiments in (e.g.) agriculture (↓Latin square) in which there are choices in putting things (seeds, fertilizers, etc.) into groups, we must know the number of degrees of freedom to work out the results.

de'hiscence (dii'hisəns) – splitting open, e.g. of a seed-container to let out the seeds.

'dehy'drate ('diihai'dreit) – to dry; to get all the water out from, e.g. from eggs to make egg-powder; the word usually means to dry at a low temperature, e.g. with the help of a vacuum so as to keep the taste (etc.) unchanged.

dehydration – drying, loss or removal of water, e.g. the splitting off of a molecule of water from a larger molecule, the removal of water from crystals, oils, etc.; loss of water from the body, e.g. by sweating and lack of drinking-water as in the case of lost travellers, or by action of the bowels in ↓cholera.

'deka-/ ('dekə) – 10.

dele, de'lete (dii'liit) – take out a letter or word from printed matter, e.g. in setting right a mistake: the sign for it is δ.

delft (delft) – pottery made of fine clay, covered with an opaque (not transparent) tin glaze on which decorations are painted.

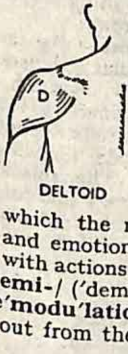
'deli'quesce ('diilai'kwes) – take up water from the air and so become liquid, e.g. table-salt in wet weather.

de'lirium (di'liriəm) – excited dreamy state in serious illness. **delirium tremens** (- 'triimenz) – excited state in which unreal things are seen, caused by much drinking of alcohol.

'Dellinger fade-out ('delindʒə -) – silencing of short radio waves by the ↓D layer of the atmosphere.

'delta ('deltə) – Greek letter D, written Δ or δ; triangle of low land where a river branches out towards the sea.

delta rays – electrons given out when ↓alpha particles go through matter, e.g. through a sheet of aluminium.



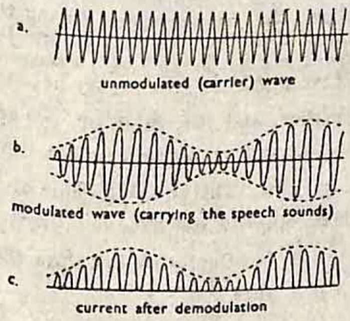
DELTOID

'deltoid muscle ('deltɔid -) – triangular muscle of the shoulder.

de'mentia (dii'menʃiə) – weakness of the mind, e.g. in old age. **dementia praecox** (- priikɔks) – a form of mental disorder which may come at the age 14–20 in which the mind is turned inwards and emotions do not seem to agree with actions.

demi-/ ('demi) – half.

de'modu'lation (dii'mɔdiu-) – taking out from the current set up by the high-frequency radio waves the low-frequency current which represents the speech sound. Also called **detection.**



a. unmodulated (carrier) wave

b. modulated wave (carrying the speech sounds)

c. current after demodulation

DEMODULATION

de'mography (di'mɔgrəfi) – study of numerical information about the population (people) of, e.g., a country and how the numbers vary with time.

de'mulcent (medicine) (di'mʌlsənt) – which gives ease and comfort to an inflamed and sore surface, e.g. in the throat.

de'my (di'mai) – printing paper 17½ × 22½ inches; writing paper 15½ × 20: (16 × 21 in America).

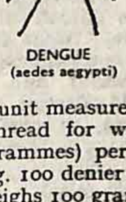
'denary – ↓binary.

'denatu'ration ('dii'næt-) – loss of original nature or qualities, e.g. as when an egg is boiled and the proteins become solid, as when rubber ceases to be elastic.

de'natured alcohol (– **spirit**) (dii'neitʃəd) – alcohol made not fit to be drunk.

DENDRITES

/-dendr-/ (-dendr-) – tree, e.g. **'rhodo'dendron** – a red-flowering bush. **'dendrites** ('dendraits) – small branches of a nerve cell with which it joins up with other nerves.



DENGUE
(aedes aegypti)

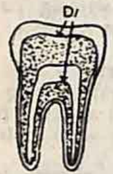
'dengue ('deŋgi) – a fever causing headache, redness of the eyes and pains in the back and joints; each attack lasts about 3 or 6 days. It is carried by a mosquito, *'Aedes ae'gypti*, which also carries yellow fever.

'denier ('deniə) – unit measure of silk or cotton yarn (thread for weaving, etc.), weight (grammes) per 9,000 metre length, e.g. 100 denier yarn = such yarn as weighs 100 grammes per 9,000 yards length. If 100 denier yarn is broken by a pull of 200 grammes, it has a tenacity (strength) of 2 grammes denier.

de'nominator (di'nɔmi-) – the number below the line in a fraction, e.g. 4 in ¾.

'deno'tation ('diino'teiʃən) – the thing pointed to by a word (not the emotion or ideas carried with the word = connotation).

dense – closely packed, e.g. a dense cloud. **density** – the relation of mass (the amount of matter) to volume (the space into which the matter is packed), e.g. number of pounds per cubic foot, grammes per cubic centimetre.

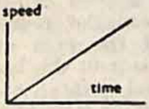


DENTINE

dent-/ (dent-) – tooth. **'dentate** – having teeth. **'dentine** (-tiin) – bone-like material of which teeth are made. **dental formula** – description of number and kinds of teeth in man or animal. **den'tition** – the growing of teeth, the arrangement of the teeth.

de'nuded (di'njuudid) – uncovered; e.g. **denuded rock** – rock from which all soil has been washed (or taken) away.

de'odorant (dii'oudərənt) – substance which takes away the smell from a substance or place.



DEPENDENT VARIABLE

de'pendent 'variable – Example: The speed of a falling stone depends on the time during which it has been falling. Both the speed and time are variables (quantities which change). In this case speed is the dependent variable because it depends on the time (which is the independent variable). In making a graph it is usual to mark the dependent variable upwards and the independent variable sideways.

de'pilatory (di'pilətəri) – substance used to take away hair, e.g. from the face or arms of a woman.

de'polarizer (dii'pouləraizə) – substance used to prevent weakening of voltage in an electric cell due to ↓polarization (collection of hydrogen on the copper plate of a copper-zinc cell; and so also in other cells). A cell is depolarized by a substance which takes away the polarizing substance, e.g. manganese dioxide in an ordinary dry cell.

de'pression (di'preʃn) – (1) pressing down; (2) part of a surface lower than the other parts; (3) area where the pressure of the atmosphere is low in the centre and higher towards the outside; the air moves round in a circle (against the clock) in the northern half of the Earth; a depression usually brings bad weather.

depression (mental) – feeling of sadness and hopelessness. **'manic depressive insanity** ('meinik -) – disorder of the mind in which there are changes between wild excitement and complete hopelessness. **depressor** (nerve) – which causes action to be less, e.g. of the heart (= which makes the heart beat more slowly).

de'rivative (di'rivətiv) – thing derived (produced, obtained) from.

derivative of a function – "y is a function of x" means that y depends upon x, so that, as x changes, y changes; e.g. the distance (y feet) through which a stone falls depends upon the time (x seconds) for which it has been falling. The relation (here) is $y = 16x^2$. From this function (relationship) we can calculate a second (derived) function which shows how speed (= distance ÷ time) depends upon time.

$$\frac{\Delta y}{\Delta x} = \frac{\text{Bit of distance}}{\text{Bit of time}}$$

shows the average speed during the bit of time Δx. We wish to find the speed *at* ("on the tick of") x seconds. If we make Δx smaller, Δy becomes smaller, and the value of $\frac{\Delta y}{\Delta x}$ gets nearer and nearer to a certain limiting value. This limiting value of $\frac{\Delta y}{\Delta x}$ is the speed at x seconds and is written $\frac{dy}{dx}$. By ↓calculus we can show that, if $y = 16x^2$

$$\frac{dy}{dx} = 32x$$

So that speed after 1, 2 . . . seconds = 32 × 1, 32 × 2 . . . feet per sec.

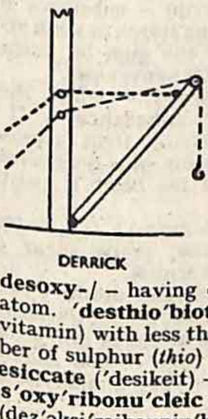
The new function $\frac{dy}{dx}$ ($32x$ in this example) is the derived function.

derivative of y with respect to x – see Derivative of a function. The derivative of y with respect to x is $32x$ in the example given.

de'rived units (di'raivd) – measures based on the three measures length, mass, time, e.g. speed = Length in a certain Time. ↓dimensions (theory of).

derm- – (dəəm-) – skin, e.g. **'derma'titis** – inflammation of the skin. **'dermis** – inner layer of the skin (below the outside layer, the **'epi'dermis**). **dermoid cyst** – part of the outer skin layer of the body enclosed (by accident of growth) in the inner part of the body.

'derrick ('derik) – a form of crane for lifting and moving heavy weights, e.g. into a ship. A beam is hinged to the bottom of the mast; a rope passes over a pulley wheel at the top.



DERRICK

des-/ (des-) – without, e.g. **desoxy-/** – having one less oxygen atom. **'desthio'biotin** – ↓biotin (a vitamin) with less than the full number of sulphur (*thio*) atoms.

'desiccate ('desikeit) – to dry.

des'oxy'ribonu'cleic acid (D.N.A.) (dez'ɔksi'raibouniu'kle.ik -) – a complicated substance built up from desoxyribose (a sugar) and other groups of atoms in long chains; found in the ↓chromosomes of a cell nucleus. It plays an important part in reproduction and heredity.

'desqua'mation ('deskwə'meiʃn) – the upper surface of the skin coming off in thin pieces as in ↓scarlet fever.

des'tructive 'disti'llation – strongly heating a substance in such a way as to cause chemical changes in it, so as to get some substance out of it, e.g. getting coal gas from coal, or acetic acid and wood-tar from wood.

des'tructive 'test – test of strength in which the thing tested is broken or cut or pulled apart.

de'tector valve (di'tektə -) – radio valve which ↓demodulates (takes out from the radio waves the current which represents the speech sounds).

de'tent (di'tent) – detainer, thing which holds back; spring B in the diagram of ↓chronometer escapement.

de'tergent (di'təədʒənt) – substance used for cleaning, e.g. for dissolving, loosening or rubbing away dirt and grease so that it is carried away with the water.

de'terminants (di'təəminənts) – way of solving simultaneous equations (set of 2 or more equations which bring in 2 or more unknown quantities). Example: to find the value of x and y from the equations $3x + 2y + 2 = 0$, $4x + 5y + 12 = 0$. The expression $\begin{vmatrix} 3 & 2 \\ 4 & 5 \end{vmatrix}$ means multiply crossways and take away, thus $(3 \times 5) - (2 \times 4) = 15 - 8 = 7$. This is a determinant. Arrange the equations as shown in lines (across) and columns (up and down), thus:—

Column	a	b	c
Line (1)	$3x$	$+ 2y$	$+ 2 = 0$
Line (2)	$4x$	$+ 5y$	$+ 12 = 0$

Then $3x$ is in Line 1, Column a; call this $3\ a_1$; $5y$ is in Line 2, Column b; call this $5\ b_2$; etc. Then –

$$x=\frac{\begin{vmatrix} b_1 & c_1 \\ b_2 & c_2 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}}=\frac{\begin{vmatrix} 2 & 2 \\ 5 & 12 \end{vmatrix}}{\begin{vmatrix} 3 & 2 \\ 4 & 5 \end{vmatrix}}=\frac{2\times 12-2\times 5}{3\times 5-2\times 4}$$

$$=\frac{24-10}{15-8}=\frac{14}{7}=2.$$

$$y=-\frac{\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}}=-\frac{\begin{vmatrix} 3 & 2 \\ 4 & 12 \end{vmatrix}}{\begin{vmatrix} 3 & 2 \\ 4 & 5 \end{vmatrix}}$$

$$=-\frac{3\times 12-2\times 4}{3\times 5-2\times 4}=-\frac{36-8}{15-8}$$

$$=-\frac{28}{7}=-4.$$

'detonate ('detəneit) – explode suddenly (not slowly like a substance used to drive a bullet).

'detonator – fulminate of mercury (or other easily exploded substance) in a cap (e.g. at end of the cartridge of a rifle or gun). The explosion of the detonator causes the substance in the cartridge (e.g. cordite) to explode.

de'tritus (di'traitəs) – (1) heavier matter which falls down to the bottom, e.g. from sewage (waste matter of a city) when it is passed into the first large container at the sewage-works; (2) substances rubbed away from rocks by the wind or by water, e.g. sand.

'detu'mesce ('diitju'mes) – become less swollen.

'deut-/, 'deutero- (di'ut-ero-) – second. **deu'terium** – heavy hydrogen, having an ↓atomic weight of 2 (instead of 1 as in normal hydrogen).

'deuteron – the nucleus of an atom of deuterium, one proton (positive charge) and one neutron: (in normal hydrogen there is no neutron).

developed width – width of a metal part after it is finished; so also developed length.

de'veloper – chemical substance used to change silver salts into silver metal on a photographic plate after it has been exposed to light in a camera.

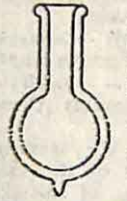
'devi'ation ('diivi'eiʃən) – ("wandering away"): difference from the true or the average. **magnetic deviation** – angle between the north as shown by the ship's compass and the true north, caused by the iron, etc., in the ship. ↓variation (= difference between true north and magnetic north).

deviation (*statistics*) – differences of measures from the mean (average) of all the measures, e.g. **mean deviation** – average of the differences from the average, e.g. Marks 8, 9, 11, 7, 9, 10; average = 9; deviations from the average = 1, 0, 2, 2, 0, 1; mean deviation

$$=\frac{1+0+2+2+0+1}{6}=1.$$

de'vitrifi'cation – gradual formation of very small crystals in glass and glassy minerals so that they become less transparent.

De'vonian rocks (Devonian system) (de'vouniən) – layer of sandy rock about 320–275 million years old. Fossils of tree-like plants, mosses and fish are found in it.


DEWAR FLASK

'Dewar flask ('djuə-flaask) – vacuum bottle (like Thermos) used to keep cold things cold, or hot things hot.

dew-point (djuu -) – When the temperature falls to the dew-point the air just ceases to hold its water-vapour and drops of water (dew) begin to form.

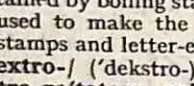
'dextrans ('dekstrənz) – general name for complex ↓carbohydrates which are built up from dextrose (glucose) units.

'dextrin ('dekstrin) – substance obtained by boiling starch in weak acid, used to make the gum on postage stamps and letter-envelopes.

'dextro-/ ('dekstro-) – right. **'dextro-ro'tatory substance** – If a beam of ↓polarized light is passed through a solution of a dextro-rotatory substance the beam is twisted to the right.

'dextrose ('dekstrous) – ↓dextro-rotatory glucose, grape sugar (a found in sweet fruits).

di-/ (dai-) – two, e.g. **diode** – radi valve with two electrodes; (*chemistry* containing two atoms or groups of certain kind, e.g. carbon dioxide CO_2; methyl = CH_3, dimethyl-ethe = $CH_3.OCH_3$.



DIA-/.

dia-/ – through across, e.g. **di'agonal** (dai'ægənəl), **di'ameter**: see drawing.

'dia'betes in'sipidus ('daiə'biitiiz-in'sipidəs) – (*insipidus* = tasteless): disease in which there is a great flow of urine (due to brain injury) but the urine is not sugary. **diabetes 'mellitus** ('melitəs) – (*mellitus* = sweet): disease in which the body cannot make use of sugar owing to disorder of the *pancreas; and so sugar appears in the urine: *(long organ, also called sweetbread, just behind the lower part of the stomach).

'diag'nosis ('daiəg'nousis) – ("through-know"): discovering from what disease a sick person is suffering. Similarly, discovering causes of errors, defects, etc.

diagonal – ↓dia-/.

di'alysis (dai'ælisis) – separating a colloid (gum-like substance) from a dissolved substance: the dissolved substance passes through a membrane; the colloid does not.

'diamag'netic substance ('daiəmæg'netik) – substance which is very weakly magnetized by a magnetic field in such a way that it moves towards the weakest part of the field. (Iron moves towards the strongest part.)

di'ameter – ↓dia-/.

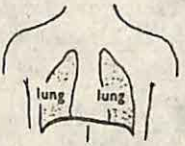
di'amide (dai'eimaid) – a substance ($H_2N.NH_2$) used for reducing (deoxidizing) salts of gold, silver and platinum; also called ↓**hydrazine**.

di'amidines (dai'æmidiinz) – drugs used against diseases caused by trypanosomes (e.g. sleeping sickness) and Leishmania parasites (e.g. kala-azar).

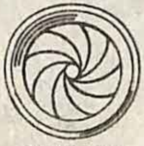
'diamine ('daiəmiin) – substance containing two amine (NH_2) groups, e.g. ethylene diamine, $C_2H_4(NH_2)_2$.

'diaper ('daiəpə) – cotton or linen cloth with raised diamond-shape marks, used on babies (as napkins).

'diapho'retic ('daiəfɔ'retik) – medicine which causes sweating.



DIAPHRAGM


DIAPHRAGM (of camera)

'diaphram ('daiəfræm) – (1) plate or stretched skin which makes, or is moved by, sound-waves (e.g. plate worked by the needle of a gramophone, or by the voice in a telephone); (2) the muscular floor of the lungs which moves up when you breathe out, and down when you breathe in; (3) the group of small plates lying one over the other by means of which the light-inlet of a camera-lens is made smaller or larger. ↓aperture.

'dia'rrhoea ('daiə'riiə) – looseness and frequent action of the bowels.

'diastase ('daiəsteis) – the substance in a seed (e.g. wheat) which turns starch into sugar when the seed first begins to grow.

di'astole (dai.'æstoli) – the expansion of the heart: (systole = contraction).

'dia'thermanous substance ('daiə'θəəmənəs) – substance which allows radiant heat (rays of heat) to pass through it, e.g. quartz, fluorspar, but not glass, which is **'adia'thermanous.**

'diathermy – causing heat to be generated inside the body by a high-frequency current. A current at a pressure of 500–800 volts is used at a frequency of over 1 million cycles per second. The ↓eddy currents generate heat. Diathermy is also used for cutting away a diseased part: the cutter is itself cold; heat is generated only where it touches; so it cuts without damaging surrounding tissues, and the cut blood-vessels are closed by the burning.

di'athesis (dai'æθəsis) – hereditary state of the body which causes it to be likely to suffer a certain disease, e.g. "He has a tuberculous diathesis" = he is likely to suffer from tuberculosis.

'dia'tomic ('daiə'tɔmik) – having two atoms in the molecule; e.g. in hydrogen gas the atoms are joined together in twos, H_2.

'diatom ('daiətəm) – microscopic single-cell plant in water. It has a frame made of silica. This frame goes to the bottom of the sea at death of the diatom and forms a sort of earth used in tooth-powder and in ↓dynamite.

DIATOMS

di'azo compounds (dai'æzou) – chemical compounds containing two nitrogen atoms thus – N:N – ; they are very important in dyes.

di'basic acids (dai'beisik) – acids containing two hydrogen atoms which may be replaced by a metal, e.g. H_2SO_4, but not HCl. ↓acid.

dicho-/ – two separate parts, e.g. **di'chotomy** (dai'kɔtəmi) – splitting into two.

di'chogamous flower – flower in which the male organ and female organ ripen at a different time.

di'chroic crystal (dai'krouik) – crystal, e.g. tourmaline, which shows different colours in different directions.

di'chromate (dai'kroumeit) – sometimes called bichromate. Chromates are salts with the group (radical) – CrO_4, e.g. potassium chromate K_2CrO_4; dichromates have the group – Cr_2O_7, e.g. potassium dichromate $K_2Cr_2O_7$. Potassium dichromate is a red-orange crystalline substance, used as an oxidizing agent (to give oxygen to other substances).

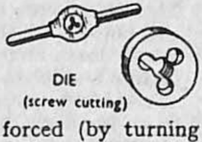
Dick test – The toxins (poisons) of scarlet fever are injected into the skin; if the person is likely to get scarlet fever the skin becomes red.

Dicophane – ↓D.D.T.

'Dicoty'ledons ('daikɔti'liidenz) – The embryo (little plant) in the seeds of Dicotyledons has 2 small leaves. These leaves may come out above the ground when the seed grows.

di'crotic pulse (dai'krɔtik) – pulse (heart beat) having a double beat; noticed in fevers where the heart is beating with great force but the small blood-vessels have lost their tone (strength).

die (dai) – a metal block pressed down onto a sheet of metal to force it into a certain shape or to cut out a certain shape. **screw-cutting die** – block of metal with a screw spiral cut inside it; it is forced (by turning it) onto a bar, and so cuts a spiral on the bar onto which a nut can then be screwed. **die stock** – holder for a screw-cutting die. **die-casting** – In ordinary casting hot metal is poured into sand, but in die-casting the metal is pressed into a metal mould. **die-sinking** – cutting out a hollow mould used for die-casting. **die-stamping** – pressing metal into a certain shape and cutting it out at the same time.


DIE
(screw cutting)

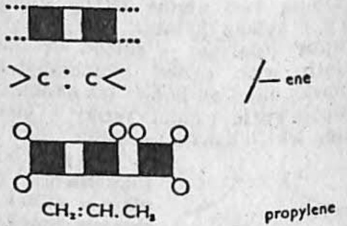
die-away curve – curve (graph) which shows an ↓exponential decay.

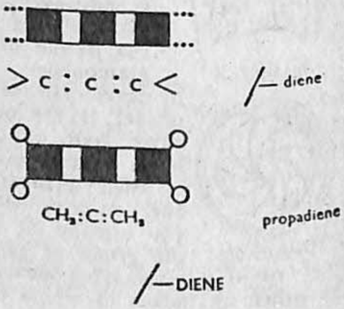
'dieldrin ('di.eldrin) – substance (compound of a hydrocarbon and chlorine) used for killing insects.

'die'lectric (substance) ('daie'lektrik) – substance which prevents the flow of electricity, e.g. the air, paper, mica between the plates of a ↓condenser. **dielectric constant** (of a substance) – the number of times the *capacitance of a condenser is increased if this substance is put in the place of air between the plates. *(power of a condenser to hold electricity.)

dielectric loss – loss of electrical energy due to vibrations set up in the molecules of a dielectric substance, thus causing heat. This heat is used in ↓radio-frequency heating, e.g. in solidifying plastic glues.

'dien'cephalon ('dai.en'kefəlɔn) – the middle brain which controls the ↓endocrine glands and is the seat of the emotions.





/-diene ('dai.iin) – Example, 'propa'diene: /-ene indicates the C:C join as in ethylene, $CH_2{:}CH_2$. So also propylene, $CH_2{:}CH.CH_3$. **/-diene** means that there are two /-ene groups; e.g. propadiene, $CH_2{:}C{:}CH_2$.

Diesel engine ('diizl) – an oil-engine in which the explosion is not caused by an electric spark as in a petrol engine but by sending a spray of oil into air which has been heated by compressing it to 500 or 600 lb. per square inch. In the **semi-Diesel** engine a hot bulb fires the oil so the compression does not have to be so great. **Diesel cycle** – the series of changes in the action of a Diesel engine: (1) suck in air; (2) compress the air and send in a spray of oil; (3) explosion and power-stroke; (4) drive out the burnt gases. There are also ↓ two-stroke Diesels.

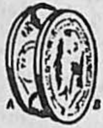
Dietl's 'crisis ('diitlz 'kraisis) – pain, fever, vomiting due to pain, resulting from bending of the ureter (tube taking urine from the kidney) so that urine does not pass.

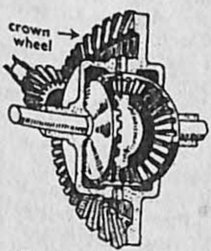
'difference tone ('difərəns -) – lower note sometimes heard when two other (different) notes are sounded.

diffe'rential calculus – ↓ calculus.

'diffe'rential 'coe'fficient – the quantity $\frac{dy}{dx}$ (or similar quantity) as explained in ↓ derivative.

diffe'rential gear (difə'renʃiəl-'giə) – gear which lets one back wheel of a car go faster than the other when the car goes round a corner. Think of two coins with two small balls (e.g. peas) between them. If coins *A* and *B* turn forward at the same speed, the peas do not move. If *A* turns forward and *B* stays still (or turns backward), the peas are rolled round between the coins. Now put an axle on each pea and fix these axles to a large gear-wheel going round outside the coins. Drive this gear-wheel from an engine (e.g. of a car): if one wheel turns slowly (as in turning to the right or left) the small inside wheels roll (like the peas) and allow the other wheel to go faster.





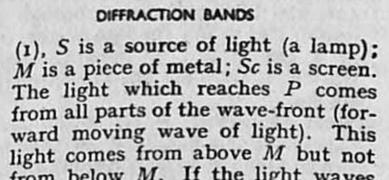
DIFFERENTIAL GEAR

'diffe'rentiate ('difə'renʃieit) – make different, become different; calculate by differential ↓ calculus (a way of calculating the slope of a curve at any one point, or the rate at which anything is changing at a certain moment).

'differenti'ation ('difərenʃi'eiʃən) – (1) the process of differentiating by ↓ calculus; (2) the creation of different kinds of cell (e.g. brain, bone) out of a fertilized egg.

di'ffraction (di'frækʃən) – the slight bending of waves (e.g. light, electrons) when they pass by a sharp edge, or round a very small Body, or through a very narrow slit.

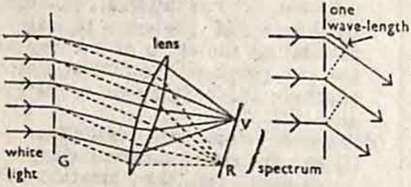
diffraction bands – fringes – dark and bright lines formed near the edge of the shadow thrown by a sharp edge or by a small Body. In drawing (1), *S* is a source of light (a lamp); *M* is a piece of metal; *Sc* is a screen. The light which reaches *P* comes from all parts of the wave-front (forward moving wave of light). This light comes from above *M* but not from below *M*. If the light waves from two points arrive together (drawing 2) they produce brightness; if the waves arrive out of step (drawing 2) they produce darkness. The total effect from all the points may be brightness or darkness according to the position of *P*. So there are bright and dark lines near the shadow. Far away from the shadow, the metal stops so little of



DIFFRACTION BANDS

the wave-front that ordinary brightness is made. (A little light bends into the shadow just below *O*.) See Huygens for more detail.

diffraction 'grating (- 'greitiŋ) – First see diffraction. A diffraction grating is a piece of glass cut with many lines side by side (e.g. 14,000–20,000 to the inch) so as to cause diffraction. The light of one wave-length is bent more (less) than that of another wave-length; so the grating separates the colours of the light and forms a ↓ spectrum (or several spectra). See left-hand drawing: *G* is the grating. In the direction shown in whole lines, waves of violet light are in step because each wave travels one wave-length less than the next one (see the right-hand drawing). So violet light comes to *V*. In the different direction, shown in broken lines, waves of red light are in step and so red light comes to *R*. A spectrum is made between *V* and *R*. So also other colours.



DIFFRACTION GRATING

di'ffusion (di'fjuuʒən) – spreading out, e.g. of a substance through a liquid, e.g. of ink through water, or of a gas in air, or light through frosted (roughened) glass or through smoke.

di'gest (dai'dʒest) – (1) soften and chemically change food so that it can be taken into the body; (2) soften substances in a **digester** – instrument in which materials are boiled into a soft mass, e.g. as the first process in making paper from wood or from waste cloth.

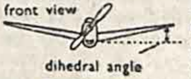
'digit ('didʒit) – finger or toe; number-sign, e.g. 1, 2, 3. **'digitigrade** – walking on the toes, not **'plantigrade** (walking on the flat foot), e.g. dogs are digitigrade.

digital computer – ↓ computer.

DIGITALIS

digi'talis (didʒi'teilis) – drug got from the leaf of the wild foxglove; it contains **digitalin** and related compounds; it causes increased action of the muscles of the heart and tightens the walls of the arteries.

di'hedral angle (dai'hiidrəl) – angle between two surfaces, important in relation to the wing - angle of aeroplanes.



DIHEDRAL

di'late (dai'leit) – become wider, cause to be wider, e.g. the pupil of the eye dilates in weak light. **'dila'tation** ('dailə'teiʃən) – causing to open wider.

'dila'tometer – instrument for measuring changes of volume of (e.g.) a liquid when it is heated, or of a solid as it melts.

di'lute (dai'ljuut) – add liquid to (e.g. to paint, to medicine). **'dilute acid** ('dailjut) – diluted acid. **'diluent** ('diljuənt) – liquid so added, e.g. to an acid to make it weaker.

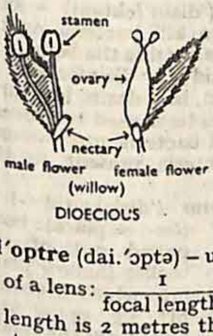
di'mensions (di'menʃənz) – A flat square (triangle, etc.) has 2 dimensions, (1) length, (2) breadth. A solid has 3 dimensions, (1) length, (2) length across, (3) length through (thickness). **Theory of Dimensions** – There are three quantities on which all other measurements are based: (1) length, (2) mass (= the amount of matter in a Body = (roughly) its weight), (3) time. All other measures can be expressed in these three measures: e.g. velocity (speed) = so-much length in so-much time; density = so-much matter in so-much space. The Theory of Dimensions says that Like can only equal Like: length = length; mass = mass; time = time. Example: "The length of my garden is twice the height of my house"; this is possible, because length and height are like quantities. But "The length of my garden is twice the weight of my car" is not possible. To test any mathematical statement, e.g. $D = \frac{1}{2}at^2$ (distance travelled = $\frac{1}{2}$ × acceleration × time^2), translate it into Length, Mass, Time; it cannot be right if it is not a statement of Like = Like.

di'methyl-ph'thalate (dai'meθil-'fθaalɛit) – substance used to keep insects away and to kill young mites (spider-like insects) which carry ↓typhus.

DINGHY

'dinghy ('diŋgi) – small open boat.

'diode ('daioud) – radio valve containing only 2 electrodes: cathode (negative) which is usually a hot wire, anode (positive) plate. Electrons travel from the cathode to the anode. If an alternating voltage is set up across the anode and the cathode, current can pass in one direction, but is stopped from flowing in the opposite direction. ↓triode.



DIOECIOUS

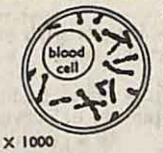
di'oecious (dai.'iiʃiəs) – (plants) which have male organs and female organs on separate plants, e.g. hemp willow.

di'optre (dai.'ɔptə) – unit of the power of a lens: $\frac{1}{\text{focal length}}$. If the *focal length is 2 metres the power is $\frac{1}{2}$ = + 0·5 dioptre. *(distance within which a lens makes parallel light come to a focus (point).)

di'optric – ↓catoptric.

dip – A compass needle balanced in the middle before it is magnetized, does not lie level after being magnetized; it dips (is lower) at one end, because it is pulled down by the magnetism of the Earth. **angle of dip** – (1) as above; (2) the angle at which a stratum (layer) of rock goes down into the Earth.

diph'theria (dif'θiəriə) – infectious disease in which a membrane is formed on the throat. **'diphtheroid bacilli** ('difθərɔid-) – bacteria shaped like the Klebs Loeffler bacilli which cause diphtheria.



diphtheroid bacilli
DIPHTHERIA

dipl-/-o-/ – double. **'diplo'cocci** ('diplo'kɔkai)–round bacteria which grow in pairs (two together), e.g. – of ↓pneumonia.

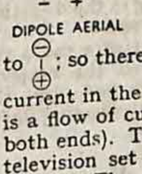
'diploid ('diplɔid) – having the usual (double) number of ↓chromosomes, e.g. in Man, 46. A sex cell has only a single set of chromosomes, e.g. in Man 23: the other set comes from the father (or mother) and so makes up the diploid number. Sex cells are haploid. ↓diplosis.

dip'lopia (dip'loupiə) – seeing double.

dip'losis – doubling the number of ↓chromosomes – as in the farm or garden varieties of certain originally wild plants.

di'polar (molecule) (dai'poulə -) – molecule in which the atoms are so arranged that the molecule has a ⊕ and a ⊖ end, e.g. $\underset{+\,-}{\text{H.Cl.}}$

'dipole aerial – aerial consisting of two parts, e.g. as shown in the drawing. As the first part of a radio wave comes to it, it makes the ends $\overset{\oplus}{\underset{\ominus}{|}}$; in the second half of the wave this is changed to $\overset{\ominus}{\underset{\oplus}{|}}$; so there is the greatest flow of current in the middle (because there is a flow of current in from (out to) both ends). The lead-in to the (e.g.) television set is therefore from the middle. The aerial is usually made $\frac{1}{2}$ the length of the wave.



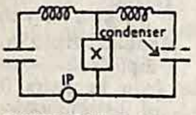
DIPOLE AERIAL

'dipso'mania ('dipso'meiniə) – a disease in which the sufferer is unable to control his desire for alcohol.

dip-stick – rod put down into a petrol-container or oil-container to see (by wetness of the end) how much liquid is in it.

'Diptera ('diptərə) – insects with one pair of transparent wings, e.g. house-flies.

'diptychs ('diptiks) – two folding doors, e.g. over a picture or carving in a church.



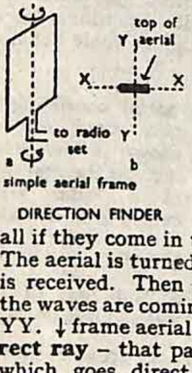
DIRECT-COUPLED CIRCUIT

direct-coupled circuit – See coupled circuits. In an indirectly coupled circuit a coil induces electric current in another coil (which it does not touch). In a direct-coupled circuit the resistance *X* (or another coil, or a condenser) is a part of both circuits, and the current flows from *IP* (input) through both.

direct current – steady flow of electricity always in one direction, not as in alternating current.

direct current restorer – ↓D.C.

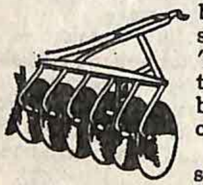
direction finder – radio with an aerial on a frame which can be turned round. Drawing (b) is the top view of the aerial. The aerial receives best if the radio waves come in the direction XX and not at all if they come in the direction YY. The aerial is turned so that no signal is received. Then it is known that the waves are coming in the direction YY. ↓frame aerial, sense.



DIRECTION FINDER

direct ray – that part of a radio ray which goes direct to the receiver without being reflected by the *Heaviside layer: *(reflecting layer of upper atmosphere).

di'rectrix – ↓parabola.



DISC HARROW

dis-/ – cause to be not in a certain state, e.g. **dis'colour**–cause not to be coloured as before, to spoil the colour of.

disc, disk – solid wheel. **disc harrow** – set of discs on a frame rolled over the ground to break it into a fine powder (so also **disc coulter, disc plough**).

dis'charge – to send out, to remove or free from; that which is sent out, removed or set free; poisonous matter sent out from a wound; the passage of electricity (e.g. a spark, an ↓arc) through an ionized gas. **discharge a cell** (*electric*): take electricity out of a storage cell.

discharge tube – a general name for an instrument in which an electric current flows through a vacuum or a gas at low pressure.

discharge lamp – a tube filled with gas at a low pressure; when electricity passes through the gas, the gas gives out light. ↓mercury vapour lamp, neon lamp.

dis'crete (dis'kriit) – separate, e.g. discrete spots on the skin, not all running together in a general redness.

'disin'fectant ('disin'fektənt) – substance used to kill bacteria on infected surfaces outside the body, e.g. ↓carbolic acid; a disinfectant is used in a room, in a drain, lavatory, etc.: an antiseptic is used to prevent the entering of bacteria into a wound or to kill bacteria present in the wound.

DISLOCATED BONE

'dislocated bone ('disləkeitid -) – (*loc-* = place): bone pulled out of the socket (hollow place into which it should fit), e.g. upper arm bone from the shoulder.

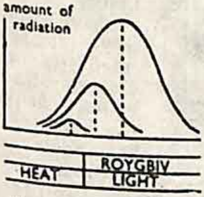
dislocation (of a crystal lattice) – very small cracks in a metal where atoms have slipped out of place in the ↓lattice.

dis'orien'tation (di'sɔɔrien'teiʃən) – disordered state of mind, in which the sufferer has no idea of space (where?) or time (when?).

dis'persal (dis'pəəsəl) – scattering outwards, e.g. of animals over a land where they have not been before, of seeds from a plant.

dis'persion – When light of a long

wavelength (e.g. red) enters a transparent substance (e.g. glass) it is bent less than light of a shorter wavelength (e.g. blue); this causes a beam of white light (made up of light of various wavelengths) to be dispersed into a band of colours when it passes through a prism. ↓ spectrum.



DISPLACEMENT, LAW OF

dis'placement (dis-'pleismənt) – weight of water pushed aside by a ship lying in the water.

displacement, Wien's law of – The law deals with the radiation (sending out of energy in the form of heat and light of various colours) from a hot Body. A red-hot block of iron does not send out all the energy in the red part of the spectrum. Its radiation is distributed (spread out), as may be shown in the form of a curve, over the heat part and the red-light part of the spectrum. If the block is made white-hot, the curve is taller (because more energy is radiated) and the curve is "displaced" (moved along) nearer the violet end of the spectrum. Wien's law is an exact statement of this, and also states how one can work out in which colour there is most energy, and how much energy there is, for any temperature.

dis'sect (di'sekt) – cut up into parts; cut up the body of a plant or animal in such a way as to find the shape and relationship of its parts, e.g. in studying to be a doctor.

dis'seminate (di'semineit) – scatter.

disseminated scle'rosis (- skle'rousis) – a disease in which the tissue surrounding the nerves of the brain and the spine becomes hardened in scattered places; the fatty covering of the nerves is then destroyed so that the nerve fibres are exposed and no longer carry impulses.

dis'soci'ation (*chemistry*) (di'sousi'eiʃən) – Some molecules break up (dissociate) into simpler molecules when they are heated, e.g. $PCl_5 \rightarrow PCl_3 + Cl_2$: phosphorus pentachloride → phosphorus trichloride + chlorine; the simpler molecules join again on cooling.

dissociation (of the mind) – a breaking up of the mind so that different sets of emotions and ideas take hold of the person at different times, and he is no longer one character, but behaves like a different person at different times.

di'ssolve (di'zɔlv) – cause a substance to divide into very small particles in a liquid so that it forms a **so'lution,** e.g. sugar dissolves in water. The substance in such a solution can be separated out only by boiling or freezing. Gases can be dissolved in liquids (e.g. soda-water). Solids can be dissolved in solids, e.g. alloys and ↓ amalgams.

'distal ('distəl) – further, e.g. "The distal end of a bone" = end further from the trunk (body).

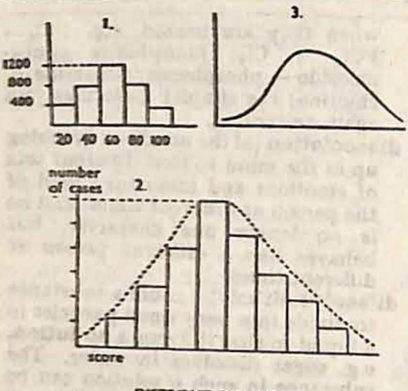
'distance re'ceptors – organs by which an animal can have knowledge of a thing at a distance, e.g. eyes (but not the feeling-nerves of the skin).

dis'temper (dis'tempə) – (1) water-paint for the inside walls of rooms; (2) a disease of dogs caused by a ↓ virus.

dis'til (dis'til) – make a liquid into vapour, then make the vapour into liquid, e.g. as in separating alcohol from water.

dis'tortion (dis'tɔːʃən) – twisting out of shape, e.g the image of the face is distorted by a mirror which is not flat; music or speech is distorted by a bad radio set.

'distri'bution curve – scatter-diagram – a way of showing how a set of marks or measures is spread out over the range of measures. Thus in (1) the first block shows that 400 people get 0 to 20 marks; 800 get 21 to 40 marks, etc. If the sets of marks were smaller (e.g. 10, 20, 30) there would be more blocks as in Diagram 2. The curve 3 shows what the distribution would be if the blocks were the thinnest possible. ↓ normal distribution.



DISTRIBUTION CURVE

dis'tributor – instrument which sends electric current to the sparking plugs (which fire the petrol vapour) in each cylinder in the right order in a motor-car engine.

'diu'retic ('dai.uə'retik) – medicine which causes a flow of urine.

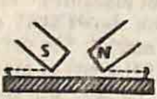
di'urnal (dai'əənəl) – during each day.

di'valent (dai'veilənt) – able to combine with (or take the place of) 2 atoms of hydrogen; e.g. oxygen is divalent, H_2O: copper is divalent, Cu:O.

di'vergent (dai'vəədʒənt) – becoming further and further apart. **divergent evolution** – gradual development so as to become more and more different as time goes on. **divergent lens** – lens thinner towards the middle; it makes a parallel beam of light spread outwards.

DIVERTICULUM

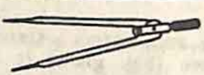
'diver'ticulum ('daivəə'tikjuləm) – piece of inner membrane pushed out through a weak part of the wall of the throat, so forming a bag in which food is caught; so also in the bowel and other hollow organs.



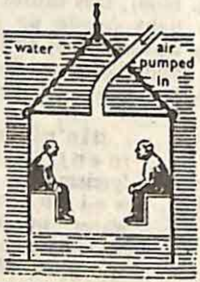
DIVIDED TOUCH

di'vided 'touch – way of magnetizing a bar of iron.

di'viders (di'vaidəz) – two pointed rods joined at one end, opened and shut to measure distance.



DIVIDERS



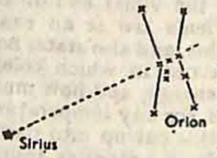
DIVING BELL

'diving bel ('daiviŋ -) – container le down into th water in whic men work belo water. The bottom is open bu the water is kep out by pumpin in air.

docu'mentary ('dɔkju'mentəri) – cinema film i which real people and place are shown (no just a story).

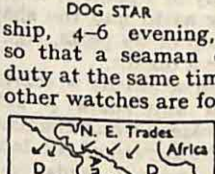
do'dec-/ – 12; e.g. **do'decagon** (dou'dekəgɔn) – 12-sided figure.

doff – take off, e.g. **doffer** – worke who takes full *bobbins off a spinning machine *(rollers on which thread is wound); also a comb which takes the mat of fibre off a cardin (cotton combing) machine.



DOG CLUTCH

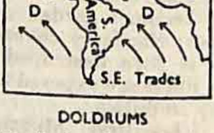
dog clutch – two wheels eac with pieces standing out fro the side so tha they lock whe they are presse together.



DOG STAR

Dog star **'Sirius** ('siriə – the brighte star seen in th sky.

dog watch – half-lengt work period in ship, 4–6 evening, 6–8 mornin so that a seaman does not go o duty at the same time every day: th other watches are for four hours.



DOLDRUMS

'doldrum ('dɔldrəmz) places near th equator (var ing from 4° N to 4° S.) whe there is litt or no wind a sea but a lot of rain.

'dolichoce'phalic ('dɔlikose'fælik) – having a long head from back to front, the breadth being less than $\frac{4}{5}$ of the length.

DOLLY

dolly – (1) a stand on wheels carrying a cinema-camera and workers when taking a cinema picture; (2) a block put against the end of a rivet opposite to the end which is being hammered; (3) a block put on top of a post which is being hammered, to protect the post.

DOLMEN

'dolmen ('dɔlmən) – a stone frame under a heap of earth made as a grave for the dead by men in ancient times.

'dolomite ('dɔləmait) – calcium and magnesium carbonate, used to line furnaces for metal-making.

do'main (dɔ'mein) – A piece of strongly magnetic (↓ferromagnetic) substance, e.g. steel, consists of many small regions, called domains, which are fully magnetized. When the bar is not magnetized as a whole the domains are acting in various directions; when the bar is magnetized as a whole in a certain direction, the domains acting in that direction grow and those acting in other directions decrease.

'dominant character, factor ('dɔminənt -) – X and Y are two "one-or-other" (contrasted) hereditary characters or factors (e.g. blue colour or brown colour of the eyes). An offspring of one parent which has the pure factor X and the other parent which has the pure factor Y is hybrid (possesses both factors). Usually one factor is **dominant** and shows in the offspring; the other factor is **recessive** and does not show. (Thus brown eye-colour is dominant to blue, and the hybrid's eyes will be brown.) If two such hybrids mate, some of the offspring may be pure with regard to X, some pure with regard to Y, and some hybrid. ↓Mendelism.

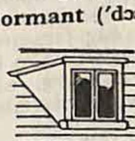
donkey-engine – small engine on a ship used, e.g. in loading or unloading. The steam comes from a special (not from the main-) boiler.

'donor ('dounə) – giver; e.g. person from whom blood is taken to transfuse it into (put into a vein of) a sick person; the atom which supplies the two electrons in a ↓co-ordinate link.

dope – liquid used to cover the woven material in an aeroplane's wings or body.

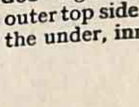
Doppler radar – ↓radar system which shows the speed (of approach or of going away) of the target (aeroplane, etc.) by a change in the wavelength of the pulses which are reflected back. ↓Doppler's principle.

'Doppler's 'principle ('dɔpləz -) – Example: a railway engine is whistling. The whistle has a certain frequency; it gives out a certain number of sound waves per second. If the engine is coming towards you, the sound-waves come to you faster (more in a second); so the note is a little higher. If the engine is going away, the waves come to you more slowly; the frequency is less, the note is lower. In the same way the frequency of the light waves from a star becomes less (lower) it the star is moving away from the Earth (higher if it is moving towards the Earth).


DORIC

'Doric 'architecture ('dɔrik -) – form of Greek building; as in the picture.

'dormant ('dɔːmənt) – sleeping, not active.


DORMER

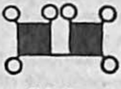
'dormer ('dɔːmə) – window in a sloping roof.

dors-/ – back. **dorsal** ('dɔːsəl) – of the back. **'dorsum** – the back.

/-dos – e.g. **ex'trados** (eks'treidɔs) – the outer top side of an arch; **in'trados** – the under, inner side of an arch.

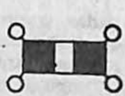
'dosage ('dousidʒ) – the correct amount of a medicine to be used, e.g. ↓Dover's powder, 5–10 grains, 0·3–0·6 gramme.

do'simeter (do'simitə) – instrument for measuring the amount ("dose") of ionizing radiation absorbed by a person over a period of time.



$CH_3.CH_3$

Single Bond

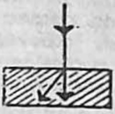


$CH_2:CH_2$

Double Bond

double bond – (chemistry) joining together of two atoms as shown; two joining points (bonds) of one atom are joined to two joining points of another as in $H_2C:CH_2$. (A single bond would be $H_3C.CH_3$.)

double 'decompo'sition – rearrangement of the atoms in two molecules to make two other molecules, thus:– $AB + CD \rightarrow AD + BC$, e.g. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$.



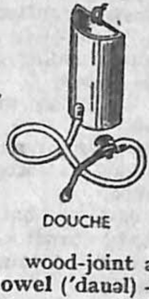
DOUBLE REFRACTION

double refraction – bending of a beam of light and breaking it up into two beams, e.g. in calcite.

double salts – a chemical compound made of two salts, e.g. alum = a salt of potassium combined with a salt of aluminium (potassium sulphate + aluminium sulphate).

'doublet ('dʌblit) – two things fixed together, e.g. 2 lenses, 2 jewels one behind the other.

douche (duuʃ) – instrument for washing out a part of the body, e.g. the bowel, etc.

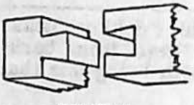


DOUCHE

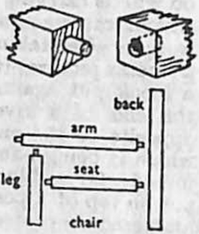
'Dover's powder ('douvəz -) – opium and ipecacuanha, used to stop looseness of the bowel; also to cause sweating, e.g. in case of a feverish cold.

'dovetail ('dʌvteil) wood-joint as shown.

'dowel ('dauəl) – pin (e.g. of wood) in one part which fits into a hole in the other part (e.g. to join one part of a broken chair-leg to another); the dowel makes sure that the two parts fit together exactly (not one slightly to the side). It also strengthens the join.



DOVETAIL



DOWEL

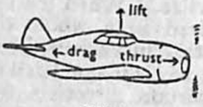
'downcast (shaft) – hole down which fresh air is taken into a mine.

drachm (dræm) – unit of measure of weight = 3 scruples = 3·9 grammes; as a measure of liquids = 60 minims = 3·55 cubic centimetres. To be distinguished from ↓dram.

draft (draaft) – depth of water needed by a ship so that it may not touch the bottom.

drafting – drawing plans, e.g. of a machine. **draftsman** – man who draws plans.

drafting (spinning) – drawing out (lengthening) of the thread in the process of spinning, due to the sliding of the fibres over each other.



DRAG

drag (dræg) – forces resisting the forward movement of an aeroplane.

dram (dræm) – $\frac{1}{16}$ of an ounce (avoirdupois, 16 oz. = 1 lb.). A liquid ↓drachm is equal to TWO drams.

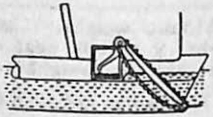
draught, draft (draaft) – (1) flow of air through, e.g., a furnace; (2) depth of water needed by a ship so that it may not touch the bottom.

draw a fire – take out the burning coal from the fire in a furnace.

'draw-bar – bar at the back of a tractor (petrol-driven engine for pulling ploughs, etc.) to which the plough is fixed.

'draw-sheet – folded sheet across the middle of the bed of a sick person.

'dredger ('dredʒə) – machine used for



DREDGER

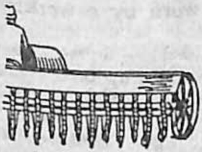
digging (or sucking) up mud from below water.

dressing – rubbing leather with oil; putting starch on threads before weaving; putting antiseptics, cotton-wool, etc. on a wound; the antiseptics, etc. so used on a wound; making stone smooth for building; cleaning the surface of metal after casting.

'driers ('draiəz) – substances which make paint dry quickly, which make cement solidify quickly.

DRIFT (tool)

drift – (1) sideways movement of a boat or aeroplane, e.g. because of a side wind; (2) first small hole made in a mine or other underground passage which is later made larger; (3) (*tool*) – bar struck with a hammer to open out a hole in hot metal and make it the right shape.

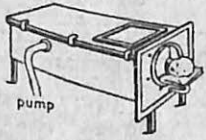


DRILL (agriculture)

drifter – boat used for catching fish with a net near the surface, the net being allowed to move with the tide.

DRILL

drill (1) (*agriculture*) – machine which is pulled over a field planting seed at regular spaces; (2) (*cloth*) – linen or cotton cloth with diagonal raised lines on it. (3) (*tool*) – tool used for making holes in metal.



DRINKER

'Drinker apparatus ('driŋkə-) – "Iron lung", instrument in which the pressure of air is regularly increased and decreased at the rate of breathing, so causing the lungs of the person inside it to act, although muscular power over them has been lost – as in ↓poliomyelitis (infantile paralysis).

drip – groove under the top stone of a wall to prevent water from running under it. **dripstone** – stone standing out above a door or window to make rain-water fall outwards.

driving-band – copper band on the back of a bullet (or shell fired from big gun); it is pressed into the spiral cut of the rifling by the force of the explosion.

driving-wheel – the wheel turned by the engine, e.g. by a railway engine; so also **driving-axle.**

drogue (droug) – open-ended bag made of sail cloth (or a thing made of wood) put into the sea so as to keep the ship's head into the wind when the sails have gone or engines stopped in very bad weather; open-ended bag pulled behind a sea-plane, used to lessen the speed, also to keep the plane from swinging from side to side in a rough sea; thing pulled behind an aeroplane for other aeroplanes to shoot at.

drop forging – shaping metal by beating it when hot between a hammer with a shaped end and a shaped block into which it is beaten.

drop wrist – hand hanging loosely down owing to loss of power in the muscles which should hold it up; so also **drop foot.**

'dropsy – gathering of liquid under the skin (or in the organs) due to various diseases.

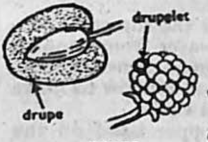
dro'someter (drɔ'sɔmitə) – instrument for measuring the amount of water deposited from the air (dew) on a certain area in a certain time.

DROSOPHILA

'dro'sophila ('dro-'sɔfilə) – ("fruit-love"): the fruit fly, used in experiments in heredity.

dross – useless material (metal oxides) which comes to the surface of melted metal.

drupe (druup) – a fruit with a hard stone surrounded by juicy flesh, e.g. cherry, plum. The seed is in the middle of the stone. **'drupelet** – one fruit (surrounding one seed) of a raspberry, blackberry, etc.



DRUPE

dry bulb – ↓ wet and dry bulb.

dry cell – electric cell containing chemicals made into a paste (not solutions); e.g. as in an ordinary torch battery. ↓ Leclanché.

dry dock – place in which a ship is held in position while the water is pumped out, leaving the ship dry for repairs.

dry rot – decay of wood causing it to fall into a dry powder, caused by a fungus which grows where there is no air-movement and slight dampness, e.g. under a floor.

'dubbing ('dʌbiŋ) – making a second sound track for a cinema film, e.g. a French language track for a film originally spoken in English.

duck – fine sail cloth (used also for strong clothing); heavy plain-surface cotton cloth.

duck-board – board with cross bars fixed to it used for walking up a sloping roof, or on soft ground.

duct, ductus – tube or pipe.

'ductile ('dʌktail) – A ductile metal can be pressed or pulled into shape while cold, e.g. copper is ductile; hard steel is not.

'ductless gland – organ in the body which makes a substance useful to the body and pours it directly into the blood-stream. ↓ gland, endocrine.

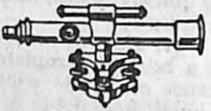
Du'faycolcr (dju'feikʌlə) – system of colour-photography. The glass (or celluloid) is covered with coloured spots, red, green, violet: (trade name).

dull e'mitter – radio valve in which the cathode (⊖ plate) sends out electrons without being made so hot that it is bright. The cathode is coated with certain chemicals, e.g. barium oxide.

Du'long and Pe'tit's law (dju'lɔŋ, pe'tii -) – "The atomic weight of an element multiplied by its *specific heat = (about) 6·3." Knowing the specific heat it is possible to calculate roughly the atomic weight. Thus (? atomic weight) × specific heat = 6·3, therefore atomic weight = $\frac{6\cdot3}{\text{specific heat}}$. The law is not true of elements of low atomic weight. *(amount of heat needed to raise a certain weight to a certain temperature compared with the amount of heat to do the same to water).

du'losis (dju'lousis) – slavery among ants.

dumpy level – instrument used to measure height in road-making, etc. A telescope is fixed to a 3- or 4-legged stand. The telescope is made exactly level. The user then looks through the telescope at a pole marked in feet (etc.) and so finds the rise or fall in the ground.



DUMPY LEVEL

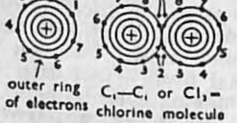
'dunga'rees ('dʌŋgə'riiz) – loose one-piece clothing worn by a workman over his clothes.

'dunnage ('dʌnidʒ) – loose waste material used to hold up boxes (etc.) from the bottom of a ship so as to keep them dry.

duodec-/ – 12, e.g. **'duo'decimo** ('djuo'desimou) – paper folded into 12 leaves (24 sides).

'duo'denum ('djuo'diinəm) – first (about) 12 inches of bowel after the stomach.

'duplet ('djuuplit) – two electrons shared between two atoms, making a bond between them.



DUPLET

'Dupuytren's con'traction ('djupitrənz -) – drawing together of the tissues of the hand so that the fingers are folded in.

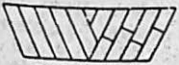
DUPUYTREN'S CONTRACTION

dur-/ – hard.

'dura 'mater ('djuurə-'meitə) –. the strong outside covering of the brain and spinal cord.

Du'ralumin (dju'ræljumin) – alloy of aluminium, copper, magnesium, silicon; it is stronger than aluminium. Soon after heating and cooling it is soft enough to cut, but it hardens later: ↓age hardening. (Trade name).

Dutch arch – flat arch made of bricks sloping inwards.



DUTCH ARCH

'Dutch 'hoe (-hou) – blade mounted on the end of, and in the same line as, a stick; used (walking backwards) to get out weeds.

DUTCH HOE

dwell – short pause (wait) in the movement of a machine, e.g. of the plate pressing paper on to type in printing.

dynam-/ – force, power, **dynamic** (dai'næmik) – adj.

dy'namic 'characte'ristic – of a radio valve. The ↓characteristic curves show how the current which flows to the anode (⊕ plate) of the valve depends upon the pressure (voltage) on the grid. The characteristic curves are usually found by testing the valve separately, but when the valve is part of a radio set, and other electric parts are joined to it, the currents are slightly different. A dynamic characteristic shows how the valve behaves under such working conditions.

dy'namic 'equi'librium (- 'iikwi'libriəm) – a steady unchanging state in which two opposite moving effects are taking part, e.g. the wire of an electric fire stays at a steady temperature because heat is continuously made in it by the electric current and heat is continuously lost to the air of the room.

dy'namic 'factor – relation between the load on any part of an aeroplane when the aeroplane is flying along at a steady speed and the load when it is accelerating (speeding up).

dy'namics (dai'næmiks) – the study of forces and the movements which they cause. **'aerody'namics** – of forces of the air. **'hydrody'namics** ('haidro-) – of forces of water and liquids.

'dynamite ('dainəmait) – very powerful explosive made of nitroglycerine (an explosive liquid) mixed with an earth made of the remains of ↓diatoms.

'dynamo ('dainəmou) – small electric generator, especially one which provides direct current.

'dyna'mometer ('dainə'mɔmitə) – (1) instrument used to measure forces, e.g. the strength of the muscles of the hand (see picture); (2) instrument like an ↓ammeter used in measuring electrical forces; (3) instrument for measuring the ↓horse-power of an engine.

DYNAMOMETER

dyne (dain) – unit of force: the force needed to make one gramme move 1 centimetre per second faster in every second. It takes a force of about 140 dynes to lift one pin, not including the force needed to move the hand and arm.

dys-/ – bad, difficult, out of order, e.g. ↓dyspepsia.

dysentery ('disəntri) – disease causing inflammation of the bowel and (sometimes) blood in the faeces (matter passed out): amoebic dysentery is caused by a single-cell organism; bacillary dysentery is caused by ↓bacilli.

dys'pepsia (dis'pepsiə) – weak digestion of food and discomfort after eating.

dys'phoria (dis'fɔriə) – not feeling well or happy (opposite to euphoria).

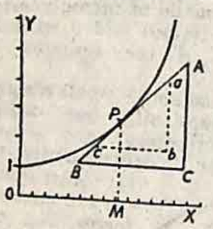
dysp'noea (disp'nii.iə) – difficulty in breathing.

dys'uria (dis'juuriə) – difficulty in passing urine.

E

e-/, ex-/ – out, e.g. **e'verted** – turned outwards; **ex'hale** – breathe out.

e – the base of the system of natural logarithms. An exponental function is a relationship of the kind $y = N^x$. If $x = 3$, $y = N^3$; if $x = 4$, $y = N^4$, etc. The diagram shows such a relationship. P is a point on the curve $y = N^x$; AB is a line showing the slope of the curve at that point. The right-angled triangle ABC is drawn as shown (the size of the triangle does not matter). The length of AC divided by BC tells the slope of AB. If N is 2·718 . . . PM is always equal to $\frac{AC}{BC}$; if the length of PM is 1·5 (etc.) the value of $\frac{AC}{BC}$ will be 1·5 (etc.). This number 2·718 is called *e*. The base of common ↓logarithms is 10: (0·301 is $\log_{10}$ of 2). *e* is the base of natural (= Napierian) logarithms; e.g. 0·693 is $\log_e$ of 2. Natural logarithms (log) are used especially in calculations of growth, decay, and compound interest. ↓exponential formula.



e (NATURAL LOGARITHMS)

E.C.G. – ↓electrocardiogram.

E.C.T. – ↓electro-convulsion therapy.

E.E.G. – ↓electro-encephalogram.

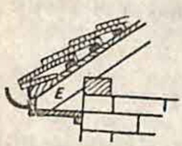
E.H.P. – effective horse-power, that part of the power produced by an engine which can be put to use.

E layer – an upper layer of the atmosphere (about 60–80 miles up) which becomes ionized (electrically active) during daylight and reflects radio waves. Also called Kennelly-Heaviside layer (ˈkenəli-ˈhevisaid).

E.M.F. – ↓electromotive force.

e.v. – ↓electron-volt.

earth (*electrical*) – wire leading to the earth so that the electricity may go back through the ground.



EAVE

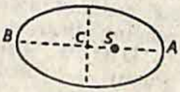
eave (iiv) – the lowest part of a roof standing out beyond the wall.

ˈebonite (ˈebənait) – hard ↓vulcanized rubber.

ˈebuˈllition (ˈebəˈliʃən) – letting out vapour or gas below the surface, e.g. as in boiling water.

ˈeburn-/ (ˈiibəən) – of or like ivory, e.g. **ˈeburˈnation** – hardening of bone into a substance like ivory.

ecˈcentric (ekˈsentrik) – out of centre, e.g. **eccentric wheel** – wheel having its axle away from the centre. **ˈeccenˈtricity of a planet's orbit** – see diagram: C = centre of orbit; S = sun; BA = longest diameter. The eccentricity = $\frac{CS}{CA}$.



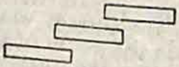
eccentricity of a planet's orbit

ECCENTRIC

ˈecchonˈdroma – ↓enchondroma.

ˈecchyˈmosis (ˈekiˈmousis) – coloured area of the skin caused by blood escaped from damaged blood-vessels under the skin.

ˈecˈdysis (ˈekˈdaisis) throwing off the outer skin (e.g. by a snake) or outer shell (e.g. by a crab).



ECHELON

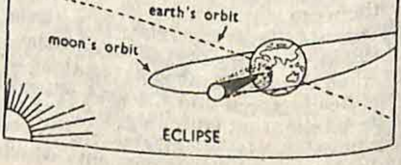
ˈechelon (ˈeʃəlɔn) – arrangement like that of the flat part of steps.

echin-/ – prickle, e.g. **Eˈchinoˈdermata** (eˈkainoˈdəəmətə) – creatures with prickly skins, e.g. sea-urchins, starfish.

ECHINODERMATA

ecˈlampsia (ekˈlæmpsiə) – sudden seizure (causing unconsciousness and sometimes death) due to a poisoning of the blood of a mother during the time before childbirth.

eˈclipse (iˈklips) – darkening of the



ECLIPSE

moon by the shadow of the Earth; hiding of the sun from the Earth by the moon; so also the passing of one planet (star, etc.) into the shadow of another.

e'cliptic (e'kliptic) – the path seemed to be followed by the sun during the year if you imagine the sun as moving round the Earth and passing by the fixed stars.

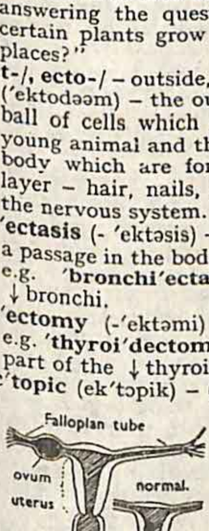
e'cology (ii'kɔlədʒi) – (*eco-* = house, dwelling): the study of living things in relation to their surroundings, e.g. answering the question, "Why do certain plants grow only in certain places?"

ect-/, ecto-/ – outside, e.g. **'ectoderm** ('ektodəəm) – the outer layer of the ball of cells which develops into a young animal and those parts of the body which are formed from that layer – hair, nails, outer skin, and the nervous system. ↓entoderm.

/-'ectasis (- 'ektəsis) – enlargement of a passage in the body due to disease, e.g. **'bronchi'ectasis** – of the ↓bronchi.

/-'ectomy (-'ektəmi) – cutting out, e.g. **'thyroi'dectomy** – cutting out a part of the ↓thyroid gland.

ec'topic (ek'tɔpik) – ("outside of . . . place") – out of its proper place: e.g. **ectopic pregnancy** – Normally the sperm (male cell) meets the ovum (female cell) in the Fallopian tube, and the fertilized ovum goes down into the uterus (female organ of childbirth) where it develops into a child. But sometimes the developing ovum becomes fixed in the Fallopian tube and develops there: this is an ectopic pregnancy.

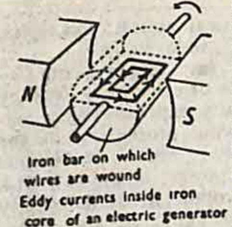


ECTOPIC PREGNANCY

'eczema ('eksimə) – (1) inflammation of the skin; (name of a condition, not of a particular disease); (2) a skin condition which runs in families (is hereditary); seen especially in babies.

eddy – part of the water in a stream which flows round and round (not straight forward with the main flow).

eddy currents – electric currents similar to eddies, set up in a block of metal (not a wire circuit) by changing magnetic fields. ↓electromagnetic induction.


N
S
Iron bar on which wires are wound
Eddy currents inside iron core of an electric generator

EDDY CURRENTS

'Eden'tata ('iiden'teitə) – group of animals (mammals) which have no (or few) teeth, e.g. sloths, anteaters.

EDENTATA

'Edison ac'cumulator ('edisən -) – an electric storage-cell made with nickel ⊕ and iron ⊖ in an alkaline liquid. The cell is lighter and less easily damaged than a lead cell, but its storage of electricity is less; often called NIFE accumulator: (trade name).

Edison effect – conducting of electricity from an incandescent (bright-hot) wire ⊖ to a cold ⊕ plate in the same container, as in a radio valve. First noticed by Edison. (American, 1847–1931.)

e'ffective (i'fektiv) – which has an effect, e.g. effective horse-power, ↓E.H.P. **effective temperature of the sun** – A ↓Black Body radiates heat-energy and light-energy better than any other Body. The energy is spread out over different wavelengths. The sun is not a perfect Black Body, but its radiation is like that of a Black Body at about 6,000° K.* 6,000° K. is the sun's effective temperature. So also other stars. *(K = temperature measured from absolute zero, from − 273° C).

'efferent nerve ('efərənt) – nerve carrying messages away from the brain and central nervous system.

'effer'vescent liquid ('efə'vesənt) – liquid in which gas is being formed, e.g. by chemical action; examples, "Fruit Salts", soda-water.

e'fficiency of (an engine, etc.) – (useful output of energy) ÷ (energy put in); usually expressed as a percentage showing proportion of the coal (oil, etc.) which an engine changes into power; in the case of a lamp, the proportion of electricity changed into light: so also other engines and electrical instruments.

'efflo'rescence (eflɔ'resəns) – production of flowers; forming a layer of crystals on the surface, e.g., of a wall due to drying out of salt; loss of water from a crystal and formation of a powder on the surface of the crystal.

'effluent ('efluənt) – any waste water flowing out; a stream flowing out from a lake; the liquid that comes out from a sewage-purifying works.

'effort 'syndrome (- 'sindroum) – feeling of illness brought on by hard work, e.g. in a person who believes that he has a "weak heart": it is due to a *subconscious desire to escape from something unpleasant: *(below the consciousness, felt but not understood).

e'ffusion (i'fjuʒən) – out-flow, e.g. of gas through a hole; out-flow of blood into the tissues.

egg-shell finish, - - surface (in paint, china, etc.) – smooth but not polished or glass-like.

'Ego, the – ('egou) – yourself as you really are, your character as made up of inborn desires changed by your experience in living. ↓ Id, super-ego.

'Ehrlich's side-chain theory ('eirliks -) – way of explaining why one attack of a disease (e.g. diphtheria, small-pox), protects the body against a second attack: the cells are believed to produce (as a result of the first illness) certain chains of atoms which unite with the poison and make it harmless. In an animal (e.g. horse, cow) which has had the disease, these side chains are formed in such numbers that they float freely in the blood and so can be put with the serum (clear liquid of the blood) into a man and act as a protection.

ei'detic 'imagery (ai'detik -) – power of thinking of something so clearly that you seem to see it (e.g. some people can remember words by calling up a picture of a page of the book).

'Einstein ('ainstain) – ↓ gravitation, relativity.

'Einstein relation – Inside the sun (and certain stars and in a nuclear ↓ reactor) matter changes into heat-energy and light-energy. The Einstein relation says that energy (measured in ergs) = matter (measured in grammes) × c^2: (c = the speed of light measured in centimetres per second). Thus $E = m \times c^2$.

e'jacu'lation (i'dʒækiu'leiʃən) – throwing out, e.g. of a liquid by an organ of the body.

e'jector (i'dʒektə) – any part of a machine or engine which throws something out; part of a gun which throws a fired cartridge or shell-case out from a gun.

e'laeo-/ (e'liio-) – fat, oil, e.g. **e'laeodochon** (e'liiodɔkɔn) – oil-supplying organ (e.g. of duck, used to oil its feathers).

'elas'ticity ('iilæs'tisiti) – quality which makes a thing (e.g. a spring, rubber) come back to its first shape after it has been pulled out of shape.

e'lastic limit (i'læstik-) – the greatest force which may be used to pull a thing out of shape and yet the thing springs back to its original shape when the force is taken away. Beyond the elastic limit the thing will stay out of shape after the force ceases. ↓ Young's modulus.

e'lastomer (i'læstoumə) – an elastic, rubber-like ↓ polymer.

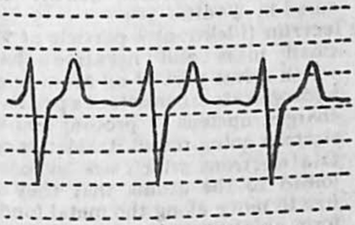
E'lectra 'complex (i'lektrə -) – in a girl, too great love of the father, and a dislike of the mother.

e'lectret – a piece of material (e.g. wax) which can keep a positive electric charge at one side and a negative charge at the other side. (Compare a magnet with its N. and S. poles.)

e'lectro-/ (i'lektro-) – having to do with electricity, e.g. **electro-chemistry** – the chemistry of ↓ electro-

electro (*printing*) = ↓ electrotype.

e'lectro'cardiogram – a line drawn by an instrument (the **electrocardiograph**) showing the electrical charges caused by the beat of the heart; used to study cases of disorder of the heart.



ELECTROCARDIOGRAM

(*By courtesy of Messrs. A. C. Cossor Ltd.*)

e'lectro-'chemical equivalent – the weight (grammes) of a certain substance deposited by the passing of one *coulomb of electricity: *(one ampere flowing for one second).

electro-chemical series – First see electrode potential. A zinc rod in a zinc sulphate solution forms positive ions ⊕ which go into the solution. Suppose we put a zinc rod in a copper sulphate solution; zinc forms positive ions more readily than copper does; so the zinc ⊕ ions go into the solution (and copper comes out of solution):–

$$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu.$$

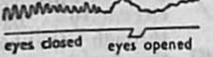
The electro-chemical series is an arrangement of the metals in order of their readiness in forming ⊕ ions. Lithium, potassium, zinc are high in the list; copper, silver, gold are low. So also a list is made of the nonmetals in order of the readiness with which they form negative ions. The lists are important in telling what will be produced by the electrolysis of a certain solution.

e'lectro-con'vulsion therapy – causing convulsions (muscular contractions and loss of consciousness) by passing an electric current through the brain, as a treatment for certain kinds of mental disorder, e.g. ↓ schizophrenia.

e'lectrode (i'lektroud) – a rod or plate or wire leading electricity into or out of a liquid, gas, crystal, part of the body, etc.

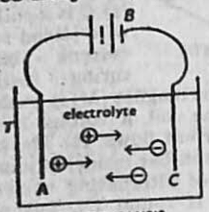
e'lectrode po'tential (- pə'tenʃəl) – Suppose a zinc rod is standing in a solution of zinc sulphate. Some of the atoms of the zinc rod become positive ions and go into the solution. So the rod (having lost ⊕ charges) becomes negatively charged. By measuring (in a certain standard way) the negative electrical potential (pressure) of the rod, we can measure the readiness with which the metal forms positive ions. So also with other metals. ↓ electro-chemical series.

electro-en'cephalogram (-en'sefələgræm) – (*en-ceph-* = in head, i.e. the brain): a line drawn by an instrument (**electro-encephalograph**) showing the electrical waves in the brain (caused by the setting free of electricity by the nerve cells): e.g. the healthy brain shows about 8–13 waves per second, but the ↓ epileptic has 6 or 7 waves per second.



ELECTRO-ENCEPHALOGRAM

e'lec'trolysis (i'lek'trɔlisis) – ("electric-loosening") = **e'lec-tro'lytic conduction** – *T* is a con**T**ainer; in it there is a liquid (the **electrolyte**), e.g. copper sulphate dissolved in water. An electric current passes from the Battery (*B*) to *A* (the Anode), through the electrolyte and to *C* (the Cathode), and so back to the battery. Negative ions (e.g. sulphate ions) pass from the cathode to the anode. Positive ions (e.g. copper ions) pass from the anode to the cathode. Copper is deposited on the cathode.

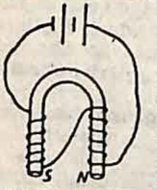


ELECTROLYSIS

e'lectro'lyte (i'lektro'lait) – (1) liquid through which an electric current can flow; (2) substance which, when dissolved in water, makes a liquid through which a current can flow. ↓ electrolysis.

e′lectro′lytic condenser (i′lektro′litik) – a condenser consisting of two aluminium plates in a solution or paste of, e.g., boric acid. A thin layer of aluminium oxide on one plate takes the place of the air (or paper or mica) in an ordinary condenser.

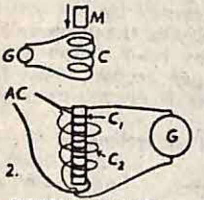
electrolytic copper – very pure copper made by electrolysis.



ELECTROMAGNET

e′lectro′magnet – a bar (or group of small bars) of iron or steel in the centre of a coil of wire. When electricity passes through the wire, the bar becomes a magnet.

e′lectromag′netic induction – the producing of a voltage (pressure of electricity) in a circuit by changing the magnetic field around the circuit. Examples: (1) *C* is a coil of wire joined to a current - measuring instrument *G*. If the magnet (*M*) is pushed down into the coil, a voltage is set up, and a current flows. (2) The coil C_1 (with an iron bar inside) is joined to a supply of alternating current. The coil C_2 is round C_1, but not touching it, and is joined to an instrument *G*. The alternating current in C_1 changes the magnetic field inside C_2 and so produces a voltage and current in the circuit C_2; this is also called mutual induction. ↓ transformer.



ELECTROMAGNETIC INDUCTION

electromagnetic waves – electrical energy travelling through space as in radio waves, light waves, X-rays, ↓ gamma rays.

e′lec′trometer (i′lek′trɔmitə) – instrument for measuring small electric charges.

e′lectro′motive force (i′lektro′moutiv) – the force (pressure) which makes or tends to make electricity flow round a circuit, usually measured in ↓ volts.

e′lectron (i′lektrɔn) – particle of very small mass and negative charge which forms part of an atom; e.g. a hydrogen atom consists of a positively charged nucleus (a proton) and one electron going round it. Metals contain electrons which are so loosely joined to the atoms that they are free to move along the metal (and so form an electric current). Electrons also exist quite separate from atoms as in a radio valve, a ↓ cathode-ray tube, and as beta-rays from radioactive substances.

electron-a′ffinity (- ə′finiti) (of a substance) – tendency of certain substances (e.g. oxidizing substances) to take away electrons from other substances.

electron camera – ↓ iconoscope.

e′lectro′negative – carrying a negative electric charge.

e′lectronics (ilek′trɔniks) – the study of instruments and machines (e.g. radio apparatus, calculating machines) in which the movement of electricity (chiefly electrons) is controlled by radio valves, etc.

electron lens – a magnetic field which focuses (brings to a point) a beam of electrons – as a glass lens focuses a beam of light.

electron microscope – We see things under the ordinary (light) microscope because part of the light is absorbed or reflected by the object (thing looked at). But, if the object is less than $\frac{1}{3}$ of the wavelength of the light, it cannot be seen, because the light flows round it. A beam of electrons from a cathode (as in a cathode ray tube or television set) behaves like a beam of light. It can be brought together or spread out by magnetic lenses and its image thrown on a photographic plate or screen (as in television). The wavelength of an electron beam is many thousand times shorter than that of light, and is able (so far) to show molecules of not less than 100–300 atoms, but may, in the future, be able to show single atoms of the heavier elements.

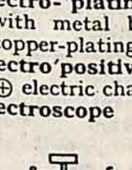
electron-volt – unit for describing the energy of a moving electron. If the electric pressure (voltage) of a plate *A* is (e.g.) 1,000 volts higher than that of a plate *B*, and an electron is pulled across from *B* to *A*, the energy of the electron when it reaches *A* is 1,000 electron-volts.

e'lectropho'resis (i'lektrofɔ'riisis) – electrically caused movement of particles in a liquid, e.g. in a ↓colloid (gum-like liquid). ↓cataphoresis.

e'lectro-'plating – covering a thing with metal by ↓electrolysis, e.g. copper-plating.

e'lectro'positive – having a positive ⊕ electric charge.

e'lectroscope – instrument which shows the presence of an electric charge. *C* is a box with a glass front; *B* is a metal bar which passes through a piece of sulphur *S* (a non-conductor). A thin leaf of gold *G* hangs at the side of the lower part of *B*. If *B* is given an electric charge (e.g. from a rubbed glass rod), *G* stands away from it. If the air in *C* becomes ionized (the molecules of gas become electrically charged) e.g. by X-rays, the charge in the gold leaf passes away through the air, and *G* falls back.



ELECTROSCOPE

e'lectro'static (i'lektro'stætik) – having to do with electricity at rest, e.g. **electrostatic generator** – instrument for producing electricity at rest, especially at high voltages.

e'lectro'statics – the study of electricity at rest, e.g. if a glass rod is rubbed with a piece of silk-cloth, it gets an electric charge. This charge is at rest (not flowing as a current through a wire).

e'lectro'striction (-'strikʃən) – change of shape of a crystal as a result of setting up an electric field across it. ↓piezo.

e'lectrotype – plate from which printing is done. Wax or plastic is pressed down on to type to make a pressed-in copy of it. The wax is copper-plated by electrolysis. Melted lead-alloy is poured into the back of the copper plate.

e'lectro'valence (-cy) (-'veiləns) – the joining of atoms into molecules by the electric force between ions; e.g. Na (sodium atom) loses an electron to Cl (chlorine atom) so that Na becomes positively charged, and Cl becomes negatively charged. $Na^{\oplus}$ and $Cl^{\ominus} \rightarrow Na^{\oplus}Cl^{\ominus}$ (sodium chloride, common salt). Also called ↓polar valency.

e'lectrum (i'lektrəm) – gold (as found in the earth) when mixed with a lot of silver; gold-silver alloy used for jewellery; nickel-silver-copper alloy.

e'lectuary (i'lektiuəri) – medicine mixed with a sweet substance e.g. honey.

E'lektron (i'lektrɔn) – alloy of aluminium, magnesium, manganese, zinc, used in engineering work, e.g. for aeroplane parts: (trade name).

'element ('elimənt) – (1) one of (about) 100 simple substances (e.g. oxygen, but not water) which cannot be split up into simpler substances and from which all other substances are built up; (2) force or part, etc., of which some complex thing is made up, e.g. "elements of the weather" = wind, temperature, etc., which acting together make up the weather; (3) the red-hot wire of an electric fire or heater.

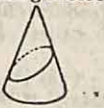
elementary particle – a general name for a particle (e.g. proton, electron, neutron, meson, neutrino) which is not itself an atom but is produced by the breaking of atoms. All are less than twice the weight of a proton (hydrogen nucleus), some are much lighter.

elephan'tiasis ('elifən'taiəsis) = **fi'lariasis** (fi'laari'eisis) – disease causing very big swollen legs (or other parts) caused by blocking of ↓lymph vessels in the body by filiaria (small worms).

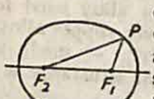
e'leuthero-/ (e'ljuθəro-) – free, e.g. **eleutherozoa** – kinds of ↓echinodermata (prickly skin creatures) which swim freely about.

ele'vation – (*lev-* = lift, raise up): a building as seen from the front; a drawing of this. **'elevator** – a thing which causes upward movement, e.g. to carry people up in a building, to lift grain (e.g. wheat) out of a ship; blade on the tail of an aeroplane used to make the aeroplane go upwards or downwards.

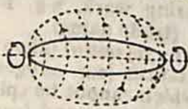
e'liminate (i'limineıt) – take away, get rid of, e.g. waste matter from the body, a molecule of water from reacting molecules.



e'lixir (i'liksə) – a sweet-tasting, pleasant-smelling medicine.



ELLIPSE

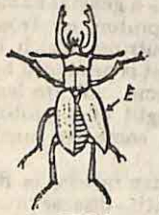


ELLIPSOID

e'llipse (i'lips) – curve obtained if a cone is cut at an angle as shown; the shape of a circle when seen at an angle. For any point P on the curve, $PF_2 + PF_1$ is the same. (F_1 and F_2 are two fixed points called the foci.) The planets move in ellipses with the sun at one of the foci.

e'llipsoid – the solid figure produced by turning an ellipse round one of its diameters.

e'lutri'ation (i'ljuutri.'eiʃən) – getting a fine powder by mixing a powder with water, letting the heavy particles settle, pouring off the upper liquid and getting the fine powder from it.



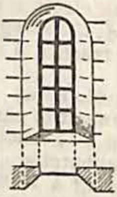
ELYTRON

e'lytron (e'litrɔn) – the hard outer wing of a beetle; plural, **e'lytra.**

em (em) – measure of print, a square as high as a piece of type of any size). **em rule** – a piece of type which prints a little line: "—" of the same length as the width of a letter m.

e'ma'nations ('iimə'neiʃənz) – radioactive gases which come from certain substances (e.g. radium) as the atoms break up.

'embolism ('embəlizm) – blocking of a blood-vessel by an **embolus** – a piece of solidified blood or a small mass of bacteria, or of fat (from a damaged bone). An embolism may also be caused by air-bubbles.



EMBRASURE

em'brasure (im'breiʒə) – opening in a wall (e.g. window, or gun-hole) with sides narrowing towards the outside.

'embro'cation ('embrə'keiʃən) – liquid used for rubbing on a swollen or painful part of the body.

EMBRYO

'embryo ('embriou) – young plant (or animal) before it comes out from the seed (or egg or its mother).

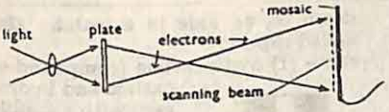
'emery paper ('eməri -) – paper (or cloth) covered with hard black grains (of ↓corundum and other rock-substance), used for smoothing and polishing metal.

e'metic (i'metik) – medicine which causes **'emesis** ('emisis) – vomiting (throwing up food from the stomach).

'emetine ('emetiin) – drug got from ipecacuanha (which causes vomiting). Emetine is used as a medicine for dysentery, a disease of the bowels in hot countries.

e'mission (i'miʃən) – sending out, e.g. of heat, light, electrons. **secondary emission** – sending out of electrons from a metal plate caused by the force of other electrons which hit it.

'Emitron ('emitrɔn) – trade name (Marconi E.M.I.) of a camera used in sending out television pictures; for a general idea of the working see iconoscope; in the Emitron the light throws a picture straight on to the *mosaic; in the super-Emitron the



(SUPER-)EMITRON

picture is thrown on to a plate and electrons from the plate are focused on to the mosaic: *(plate covered with spots of caesium).

e'mitter – a thing which sends out, e.g. the hot wire in a radio valve. ↓diode.

'emme'tropia ('eme'troupiə) – correct (not long, not short) sight.

em'mollient (i'mɔljənt) – having a softening effect on the skin.

em'pennage (em'penidʒ) – the back part of an aeroplane, the tail, with the rudder, ↓elevator and other surfaces controlling the flight.

EMPENNAGE

'emphy'sema ('emfi'siimə) – air in the tissues; big air spaces in the lungs caused by bad condition (loss of elasticity) of the lung tissue which does not spring back into position at the out-breath.

em'pirical (rule) (em'pirikəl) – known from experience, not from scientific theory confirmed (made sure) by experiment, e.g. a skilled dyer of cloth used an empirical mixture of substances which the chemist may afterwards find to be scientifically right.

'empy'ema ('empai.'iimə) – collection of pus (poisonous matter as from a dirty wound) in a cavity of the body, e.g. in the cavity where the lungs are.

e'mulsion (i'mʌlʃən) – one liquid so mixed and joined with another that it does not separate out, e.g. milk is an emulsion of water, other substances dissolved in the water, and cream-fat; the light-sensitive coating on a photographic film or plate.

e'namel (i'næməl) – ready-mixed paint which dries with a smooth glass-like surface; glass (etc.) melted onto metal as an ornament; (of tooth) – the hard glassy outside layer.

e'nantio-/ (e'næntio-) – opposite, e.g. **e'nantio'morphous crystals** – the one crystal a mirror-image (exactly opposite shape) of the other. **e'nantiomers** – chemical substances which are the same except that their atoms are arranged as mirror-images of each other.

en'capsuled (en'kæpsjuld) – (e.g. growth or tumour): enclosed inside a membrane which separates it from surrounding tissue.

en'caustic tile (en'kɔɔstik) – ("in-burnt"): tile with a design pressed into the clay, filled with the colour and then baked; or tile made of different coloured clays.

encephal-/ (usually pronounced en'sef-, but medical people prefer en'kef-) – inside the head, i.e. the brain, e.g. **encepha'litis** – inflammation of the brain. **encepha'litis le'thargica** (le'θaadʒikə) – an infectious disease of the brain and nervous system causing sleepiness and loss of various powers of mind and (or) body; caused by a ↓virus.

'enchon'droma ('enkɔn'droumə) – ("in cartilage-growth"): a tumour (diseased growth) in a bone; an **'ecchondroma** is an outgrowth, e.g. at a joint as in ↓arthritis.

end – one of the long fixed (warp) threads across which a thread (the woof) is moved in weaving. **end-and-end** – having warp threads of different colours or kinds side by side, e.g. red-white-red-white.

en'demic disease (en'demik) – disease common in a certain country, e.g. dysentery is endemic in certain parts of India (there are always some cases of the disease there); it is not endemic in England (though cases may sometimes be found in England).

end-grain – wood fibres as seen in a piece of wood cut across the grain (across the fibres).

endo-/- – inside, e.g. **'endocar'ditis** (endokaa'daitis) – inflammation of the inner lining (inner surface) of the heart.

'endocrine gland ('endəkrin -) – an

organ which makes substances (hormones) and pours them directly into the blood-stream; e.g. the adrenal gland pours adrenalin into the blood when there is sudden fear; this adrenalin causes quicker heart beat, pale skin, etc. Other endocrine glands are the pituitary, thymus, thyroid, etc. ↓gland.

'endoderm ('endodəəm) – the inner layer of cells, e.g. in earthworm, hydra. ↓ectoderm; ↓entoderm.

'endo'dermis – layer of cells in a plant round the centre of the stem; it has some control over the sideways movement of water in the stem.

en'dogamy (en'dɔgəmi) – marrying within the family or tribe.

en'dogenous (en'dɔdʒənəs) – formed inside, e.g. substances formed inside the body to be built up into the body, e.g. as in the process of growth and repair.

'endo'gens ('endo'dʒenz) – trees whose new growth starts inside the stem, e.g. palm-trees.

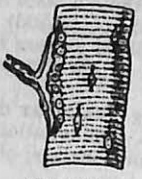
'endo'metrium ('endo'metriəm) – membrane lining the uterus (organ of childbirth).

'endo'skeleton – system of bones inside the animal (as in man). ↓exoskeleton.

'endosperm – the inside part of a seed which serves as food for the young plant when it grows. Seeds with much endosperm are often used by men and animals as food, e.g. wheat, barley, maize.

'endo'thermic process – process in which heat is absorbed. **endothermic compound** – a chemical compound in whose formation there was absorption of heat, e.g. acetylene.

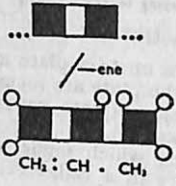
'endo'toxin – a poison (toxin) which is part of the body of bacteria so that it cannot be filtered (washed) off, e.g. typhoid: an **exotoxin** can be separated by filtering, e.g. tetanus.


END PLATE

end plate – ending of a nerve on a muscle.

end-stone – jewel, round on one side, flat on the other, put flat side down on an axle in a watch; also called cap.

/-ene – (1) hydrocarbon (compound of carbon and hydrogen) with a double bond (C:C), especially one of the ethylene series, e.g. propylene; (2) hydrocarbon whose molecule contains one or more rings of carbon atoms as in benzene, terpene.

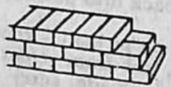


-ENE

'enema ('enimə) – liquid put into the bowel through the anus (lower-end opening); instrument for doing this.

ENEMA

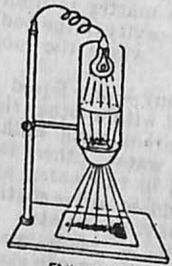
'energy – ability to work, e.g. water on the top of a hill has **potential energy**, because, when it flows down, it will be able to do work; flowing water has **kinetic** (moving) energy. **energize** – put energy into, e.g. a radio aerial is energized so that it sends out radio waves.


ENGLISH BOND

English bond – way of laying bricks, one line longways and the next sideways. **English garden wall bond** – one line of end-way and three lines of long-way bricks.

en'gorged (en'gɔədʒd) – filled very full with (e.g. with blood).

en'larger (in'laadʒə) – instrument used to throw the image of a (negative) photographic film on to light-sensitive paper and make a print larger than the negative film.


ENLARGER

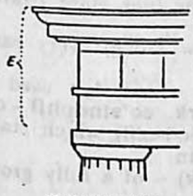
/-ennial – yearly, e.g. **biennial** (bai'enjəl) – happening every two years. **bi'ennial plants** – plants which last for two years and produce seeds in the second year; **per'ennial plants** – plants which last for several years (until they are dug up or die).

enriched fuel – uranium fuel (for a nuclear ↓reactor) which contains more fissile (able to be split) material than natural uranium contains.

'ensilage ('ensilidʒ) – grass, bean plants, etc., put in a silo-tower or hole in the ground with treacle (sugar liquid), fermented and used as a food for cattle.

en'tablature (en'tæblətiuə) – the building-work lying across the top of a line of pillars.

'entasis ('entəsis) – the slight swelling out of a pillar so that it looks straight; if it were made with straight lines it would look as if it curved inwards.



ENTABLATURE

'enter-/-o-/- – having to do with the bowel, e.g. **'ente'ritis** ('entəraitis) – inflammation of the small intestine (bowel).

en'teric fever (en'terik-) – typhoid fever, a disease of the bowel caused by a bacillus (*B. typhosus*) found in dirty water or milk, etc.

'enteron ('entərɔn) – the single cavity (hollow) in the body of Coelenterata (e.g. hydra, anemone).

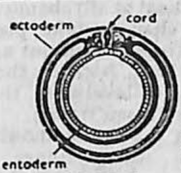
B. Typhosus
ENTERIC FEVER

'ente'roptosis ('entə'rɔptəsis) – falling (hanging) down of the bowel, e.g. because the muscle-wall is weak – as in old men with big "stomachs".

en'thalpy (en'θælpi) – the total heat (e.g. per gramme, or per pound) of a substance: all the energy of its molecules measured from *absolute zero, or from some agreed point, e.g. 32° F. for steam: *(no heat at all, 273·1° below 0° C.).

'ento-/- ('ento-) – inside, e.g. **'ento'gastric** – inside the stomach.

'entoderm ('entodəəm) – the inner skin of a developing organism (e.g. of a child inside the mother). the entoderm develops into the lining of the bowel and urinary passages; also lining of glands leading into the bowel, and lining of the wind-(breath) pipe. ↓ecto/; meso-/.



ENTODERM

'ento'mology ('entɔ'mɔlədʒi) – the study of insects.

'entresol ('ɔntrəsɔl) – floor of a house between ground-floor (level with street) and first floor (one above street level).

entropy ('entrəpi) – A certain amount of heat (measured in ↓calories) may be thought of as spread out through a large volume of matter, e.g. through 1 gallon of warm (rather low temperature) water, or as brought together in a small space, e.g. less than a gallon of water at a higher temperature, e.g. boiling water, or through a still smaller amount of water at a still higher temperature, e.g. hot steam. The higher the temperature (measured in degrees) the more work can be done in cooling to a lower temperature; steam can do more work than warm water. The relation between the total amount of heat and the temperature is called entropy. Entropy $= \frac{\text{heat}}{\text{temperature}}$.

An increase of entropy means a levelling out (equalizing) of heat in a system (set of things). When a steam-engine works, its hot steam is gradually brought down to the temperature-level of the surrounding air by changing heat into work: the higher the temperature of the steam, the greater the drop, and the more the work. If the steam cannot cool (e.g. if the surrounding air is at the same temperature as the steam) there is no drop and no work: the steam still has heat, but the heat is not **available.** Any system, including the universe, tends to distribute (spread out) its heat so that entropy is increased (so that the heat is levelled out). **The Nernst heat theorem** – Near ↓absolute zero in which there are sudden uncontrolled outbreaks of energy – crying out, tightening of muscles, noisy breathing, loss of consciousness.

e'piphysis (e'pifisis) – soft, undeveloped end of bone, made of sponge-like material; in a grown-up person it becomes hardened into bone.

'epiphyte ('epifait) – a plant which grows on another plant but does not take food from it, e.g. a fern which grows on a tree.

EPIPHYTE

'episcope – ↓ epidiascope.

'epis'taxis ('epis'tæksis) – bleeding from the nose.

'epi'thelial tissue ('epi'θiiliəl) – surface cells, e.g. **stratified epithelium** – the surface cells of the skin, eye, throat and other parts. **'ciliated epithelium** ('sili.eitid -) – epithelium covered with little hair-like outgrowths as in the throat. **columnar epithelium** – epithelium lining the bowel, urinary passage, glands, etc.

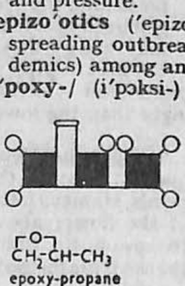
(CILIATED) EPITHELIUM

'epitheli'oma – diseased growth (cancer) of the surface cells of the body.

epi'thermal deposits – layers of metal ore formed at low temperature and pressure.

'epizo'otics ('epizo'ɔtiks) – rapidly spreading outbreaks of disease (epidemics) among animals.

e'poxy-/ (i'pɔksi-) – containing an oxygen atom which is joined to two of the carbon atoms in a chain of atoms, e.g. **epoxy-propane** (= propylene oxide). **epoxy-resins** are ↓ polymers of such compounds.



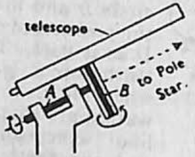
$\overset{\ \ \ O}{CH_2{-}CH{-}CH_3}$

EPOXY-/

'epulis ('epjulis) – a diseased growth on the gum (membrane covering the jaw and bases of the teeth).

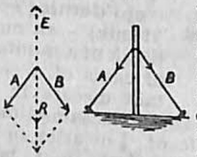
e'quation (ii'kweiʃən) – a mathematical statement that two quantities are equal, e.g. $x = 2y + 3$: or that, in order to find the value of x, you must, e.g., take twice y and add 3. **chemical equation** – way of writing down a chemical action, e.g. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$. (Zinc and hydrochloric acid combine to form zinc chloride and hydrogen.) ↓ personal equation.

'equa'torial telescope ('ekwə'tɔɔriəl) – **equatorial mounting** (of a telescope) – a telescope so set up that, once it is pointed to a certain star, it need only be steadily turned on one axle (A) for it always to point to that star.



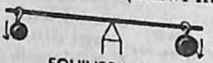
EQUATORIAL TELESCOPE

e'quilibrant (ii'kwilibrənt) – a force which balances or holds several other forces. Example – two ropes pull down on a post. The *resultant R of the forces is a downward force. The equilibrant E is the upward force of the post, balancing, and acting against, the resultant: *(single force which would produce the same results as the several forces acting together).



EQUILIBRANT

'equi'librium ('iikwi'libriəm) – state of being steady or still because forces balance. Examples: (1) a book on a table is in equilibrium: upward force due to table = weight of book; (2) a lever with balancing weights: the turning powers of the forces on each side balance. **stable equilibrium** – a state of equilibrium such that if the Body is slightly moved it comes back to its first position. **unstable**



EQUILIBRIUM

equilibrium – a state of equilibrium such that if the Body is slightly moved it moves away further and the equilibrium is upset, e.g. a pencil balanced on its point. **neutral equilibrium** – a state of equilibrium such that if the Body is slightly moved it stays in equilibrium, in its new place, e.g. a ball on a level table.

'equinox ('iikwinɔks) – time of the year (about March 21 and September 22) when the midday sun is overhead at the equator and all places have day and night of equal length (12 hours).

'equipar'tition of energy ('iikwipaa'tiʃən) – A molecule of a gas can move backwards and forwards, from side to side, up and down, or with 2 or 3 of these movements together. It may be able to spin in one or more ways, and parts of it may be able to vibrate in and out. All these different kinds of movement are called ↓degrees of freedom. If energy is given to a gas, e.g. by heating it, the energy is equally divided among the possible degrees of freedom.

e'quivalent (ii'kwivələnt) – of equal value, different yet able to produce the same result, e.g. **equivalent lens** – a simple lens which gives a picture of the same size and in the same place as a combined group of lenses.

equivalent weight (of an element) – the weight of an element which can take the place of unit weight (e.g. one gramme) of hydrogen, or can join with 8 grammes of oxygen. Example: if zinc is dissolved in an acid (e.g. hpdrochloric acid) it takes the place of the hydrogen, which is set free: 32½ grammes of zinc take the place of 1 gramme of hydrogen: the equivalent weight of zinc is 32½. When zinc joins with oxygen to make zinc oxide, 32½ grammes of zinc join with 8 grammes of oxygen. The equivalent weight in grammes is the **gramme-equivalent.**

erg (əəg) – a measuring unit of work: 1 dyne = the force which makes 1 gramme move 1 centimetre per second faster and faster every second; 1 erg is the work done when a force of 1 dyne moves through 1 centimetre. Example – about 140 ergs of work are done in lifting 1 pin through a distance of 1 centimetre (not including the work of moving the hand and arm).

'ergate ('əəgeit) – a worker ant.

er'gosterol (əə'gɔstərɔl) – substance in plant and animal fat (and in yeast) which, with the help of sunlight, becomes vitamin D. (Lack of vitamin D causes rickets, a disease causing soft bones in children.)

'ergot ('əəgɔt) – substance produced by a fungus which grows on grain. As a drug it is used to stop bleeding and to tighten muscles (e.g. of the uterus (female organ) after childbirth).

'Eros ('erɔs) – small planet (↓asteroid) which, at times, comes nearer to the Earth than any other planet; its distance can be found more easily than that of any other planet or star, and from its distance the distance of the sun, etc., can be worked out.

e'rratics – (ə'rætiks) stones of various sizes carried by moving sheets of ice in ancient times and left when the ice melted.

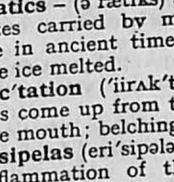
'eruc'tation ('iirʌk'teiʃən) – letting gas come up from the stomach into the mouth; belching.

ery'sipelas (eri'sipələs) – an infectious inflammation of the skin due to ↓streptococcus.

eryth-/-r-/ – red; e.g. **'ery'thema** ('eri'θiimə) – redness of the skin.

e'rythrocyte (e'riθrəsait) – red blood-cell.

es'cape, velocity of – the speed at which a thing (e.g. shot from a gun) must be going at the start if it is to get free from the attraction of the Earth – 7 miles per second. Similarly (other speeds) from any other such Body, e.g. Moon, planet.



ESCAPEMENT

es'capement (is'keipmənt) – part of a clock in which circular movement is changed into to-and-fro (oscillating) movement to keep the pendulum swinging and by which the energy of the main driving wheel is allowed to **escape** at a slow steady speed. The pendulum movement is unchanging and can be fixed so as to mark off time into exactly equal units. The impact pallet (driven by the power of the clock) is pressed by a tooth of the escape wheel: this keeps the pendulum swinging. The other pallet catches a tooth on the other side of the wheel, so that the turning of the wheel is kept in time with the swinging of the pendulum. ↓cylinder escapement, lever escapement.

es'carpment (es'kaapmənt) – a long, steep cliff of hard rock formed where sloping layers of hard rock stand out from layers of soft rock.

/-escent – becoming, growing, e.g. **ni'grescent** (nai'gresənt) – becoming black.

'eserine ('esəriin) – ↓physostigmine.

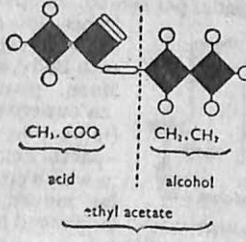
es'parto (es'paatou) – grass used in paper-making.

es'pundia (es'pʌndiə) – infection of the mouth and nose by ↓*Leishmania donovani*.

e'ssential amino-acids – those ↓amino acids which the body cannot make for itself but must get from its food in order to live.

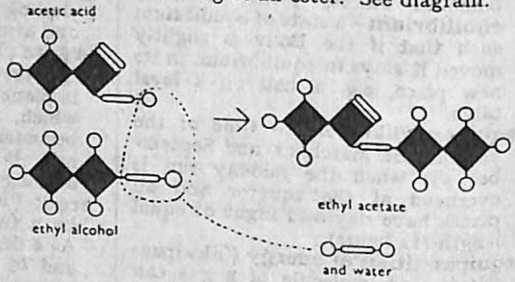
e'ssential oils – the oils which are contained in many plants and flowers and give them their particular smells.

'ester ('estə) – substance formed by combining an acid and an alcohol, e.g. ethyl alcohol (ordinary alcohol) + acetic acid (the acid of vinegar) form the ester named ethyl acetate.



ESTER

Esters are used to make scents (perfumes) and flavours, also quick-drying paint. **esterification** – the making of an ester. See diagram.



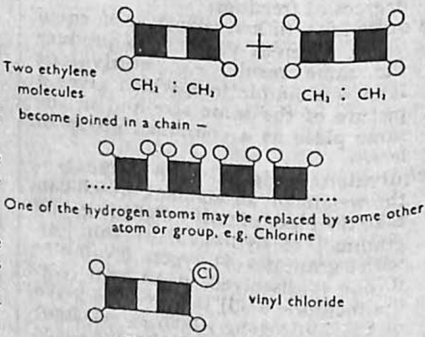
$$CH_3.COOH + CH_3\,CH_2OH \rightarrow CH_3.COO\,CH_2\,CH_3 + H_2O$$

ESTERIFICATION

'ethane ('eθein) – $CH_3.CH_3$; a colourless gas with no smell.

'ethanol ('eθənɔl) = ↓ethyl alcohol.

'ethenoid plastics ('eθenɔid), **ethenoid polymers** – plastics made by the joining together of molecules such as ethylene which have a double bond between carbon atoms, –C:C–; they include the acrylic, styrene and vinyl plastics.


Two ethylene molecules
CH₂ : CH₂
CH₂ : CH₂
become joined in a chain –
One of the hydrogen atoms may be replaced by some other atom or group, e.g. Chlorine
Cl
vinyl chloride

ETHENOID PLASTICS

'ether, aether ('iiθə) – substance thought of as filling all space through which light and radio waves (etc.) might travel.

'ether ('iiθə) – an easily vaporized liquid made from alcohol; used to produce unconsciousness for surgery; able to dissolve fats. Ordinary ether is diethyl ether ($C_2H_5.O.C_2H_5$). Other ethers contain other hydrocarbon radicals, e.g. $C_2H_5.O.CH_3$.

'ethmo-/ – sieve. **'ethmoid** – like a sieve, a plate with many holes in it. The ethmoid sinus is in the ethmoid (sieve-like) bone at the back of the nose.

ethyl group ('eθil) – the group of atoms $CH_3.CH_2$– (ethane group less one hydrogen atom). **ethyl acetate** – liquid which smells like fruit, used in making paint; for diagram ↓ ester. **ethyl alcohol** – $CH_3.CH_2OH$, ordinary alcohol as in wine. **ethyl chloride** – CH_3CH_2Cl, used to make a part of the body so cold that the pain of a small surgical treatment is not felt; also as a quick-acting general ↓ anaesthetic.

'ethylene ('eθiliin) – a gas, $CH_2:CH_2$, which burns with a yellow flame; coal gas contains some ethylene; also called **oleflant** (ouli'faiənt) gas.

ethylene 'glycol (- 'glaikɔl) – liquid used to prevent the cooling-water of a motor-car from freezing: ($HOCH_2.CH_2OH$).

ethylene 'radical – the group of atoms CH_2CH_2: e.g. **ethylene dichloride,** $\begin{array}{l}CH_2Cl\\ |\\ CH_2Cl\end{array}$ – a heavy colourless liquid used for cleaning grease off clothes, etc.

'etiolated (plant) ('iitio'leitid -) – with small yellow leaves and long stems between them caused by not having enough light.

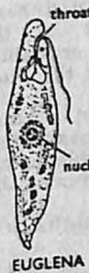
'eti'ology, aetiology ('iiti'ɔlədʒi -) – study of the causes of disease. "What is the etiology of this condition?" = "What caused this illness?"

eu-/ – well, good, e.g. ↓ euphoria.

'eudi'ometer ('juudi'ɔmitə) – instrument for measuring the changes in volumes of gases when they act together chemically: (so-called because it was first used to find the amount of oxygen – the "good" gas – in the air).

eu'genics (ju'dʒeniks) – ("well-born"): study of ways of producing a better race of men by getting children only from those most suited to become parents.

eu'glena (ju'gliinə) – one of the protozoa (very simple microscopic organisms); it looks like a small green leaf with a tail which is used for swimming; found in the green covering of standing water.



EUGLENA

'Eumy'cetes ('juumai'siitiiz) – the large group of higher (more complicated) fungi. The threads of the plant body are branched and have cross walls.

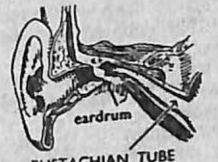
eu'phoria (ju'fɔriə) – ("well-feeling"): state of feeling very healthy and strong and excited; the feeling may be real, but it is sometimes only a sign of mental disorder, e.g. ↓ cyclothymia.

Eu'reka wire (ju'riikə) – wire made of copper-nickel, used for electrical resistance: (trade name).

'eury-/ ('juuri-) – broad, e.g. **'eury'bathic, 'euryba'thytic** – (plants, animals) able to live in a wide range of sea-depths.

'eusol ('juusɔl) – an antiseptic containing chlorinated lime and boric acid.

Eus'tachian tube (ju'steiʃiən) – tube joining the ear and throat: swallowing when going up to a height (e.g. in an aeroplane) opens the tube and so causes air-pressure in the ear to be equal on each side of the ear-drum.

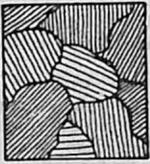


EUSTACHIAN TUBE

eus'tatic levels (ius'tætik -) – large, wide changes in the level of the sea caused by the melting (or forming) of ice at the poles.

eu'tectic mixture – (e.g. of metals): mixture in which the different substances crystallize out at the same time, and the melting point is the lowest possible for a mixture of those substances. **eutectic**

structure – (of an alloy): the size and arrangement of crystals found when all the different metals in the alloy crystallize out at the same time.



EUTECTIC STRUCTURE

′eutha′nasia (′juuθə′neiziə) – easy death; the idea that persons suffering from a painful and incurable disease should be allowed to be given a painless death.

e′vaginate (ii′vædʒineit) – turn a tube inside out.

e′vaporate (i′væpəreit) – become a vapour, cause to become vapour; e.g. petrol (motor spirit) evaporates quickly.

′Evipan (′evipæn) = hexobarbitone, a drug injected into a vein to produce general unconsciousness for surgery. ↓ barbituric acid: (trade name).

e′viscerate (i′visəreit) – take out the bowels (and other organs).

evoc-/ – "out call": e.g. **e′vocative words** (e′vɔkətiv) – words which tend to arouse an emotion as well as carry their straightforward meanings.

′evo′cator (′iivɔ′keitə) – substance which causes tissue near it to grow in a certain way, e.g. the eye cup, which develops into retina (nerve cells of the eye), contains a substance which causes other cells near it to grow into a lens.

evol-/ – "out roll": e.g. **′evolute** (′iivəljuut) – with the edges rolled outwards. ↓ involute.

′evo′lution (′iivə′luuʃən) – the development of more complicated forms of life (plants, animals, etc.) from simpler forms, e.g. the evolution of man from the simplest and earliest forms of life.

ex′acer′bation (eks′æsə′beiʃən) – (of a disease) a causing of the disease to become worse; a becoming worse.

′exal′buminous seed (′eksæl′bjuuminəs) – Albumen is the food-substance in a seed for the young plant inside the seed. In exalbuminous seeds (e.g. bean) the food is already inside the embryo (the young undeveloped plant), and there is no further food inside the seed-case. Exalbuminous is opposite of ↓ endospermous.

′exan′themata (′eksən′θiimətə) – diseases such as measles, chickenpox, which cause redness and spots on the skin.

ex′cipient (ek′sipiənt) – inactive substance in which a medicine is mixed, e.g. fat.

ex′cise (ek′saiz) – to cut out by surgery.

ex′cite – cause to be active; supply energy (especially electrical energy) to, e.g. "excite a radio aerial". **excited molecule** – a molecule which has absorbed energy, e.g. from an electric discharge: it gives back this energy in the form of light: ↓ fluorescence. **ex′citer** – (of an electrical generator) – a small electrical machine which supplies direct current to the electro-magnets of the generator.

ex′citing cause – of a disease. The predisposing cause of a disease is (e.g.) tiredness, bad food, lack of sunshine; the exciting cause is the infection (bacteria) which the person catches from someone else.

exclusion principle – the principle (rule) in science that two material particles cannot be in the same place at the same time.

ex′coriate (eks′kɔrieit) – rub off the surface of the skin.

ex′creta (eks′kriitə) – waste matter, e.g. from the bowels. **excrete** – pass out waste matter from the body, from the bowels, through the skin, in the urine, etc.

ex′foli′ation (eks′fɔli′eiʃən) – a coming off in thin layers, e.g. thin pieces of bark from a tree, thin pieces of rock in icy weather.

e′xhaust (eg′zɔɔst) – "empty out" – (of an engine) burnt gas, e.g. from the back of a motor-car. **exhaust the air from** – pump the air out of. **exhaust-fan** – wheel with sloping blades used to draw out air, e.g. from the upper part of a room. **exhaust** ↓ **manifold.**

ex′hibit a drug (eg′zibit) – give as a medicine.

'exhi'bitionism (eksi'biʃənizm) – disorder of the mind in which the sufferer shows in public parts of the body usually kept hidden.

exo-/- – outside, e.g. **'exoderm** ('eksodəəm) – outer skin. **e'xogamy** (eks'ɔgəmi) – marrying outside the family or tribe. **e'xogenous** (ek'sɔdʒənəs) – formed outside. **'exogens** – trees whose new growth is in the outer layers (as in most trees). ↓endo-/.

'exoph'thalmic goitre ('eksɔf'θælmik-'gɔitə) – disease of the ↓thyroid gland which causes the eyes to stand out (*ex-*, out; *ophthalm-*, eye) and the neck to be swollen.

EXOPHTHALMIC GOITRE

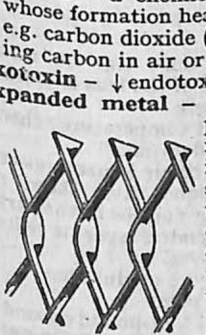
'exo'skeleton – outside horny covering and support of the tissues, as of insects (etc.). In birds and mammals, the nails and feathers form the exoskeleton.

'exos'tosis ('eksɔs'tousis) – outgrowth from a bone.

'exo'thermic process – process in which heat is given out, e.g. the burning of coal. **exothermic compound** – a chemical compound in whose formation heat was given out, e.g. carbon dioxide (formed by burning carbon in air or oxygen).

exotoxin – ↓endotoxin.

expanded metal – metal cut, then pulled out to make the cuts into diamond-shaped holes; used as a metal centre for a cement floor or roof, also to guard windows.


EXPANDED METAL

expanding universe – The sun and the ordinary stars which we can see are part of the Galactic System which we see as a faint white band across the sky (the Milky Way). There are other systems of this kind beyond the Galactic System. Their light is (in most cases) displaced (moved over) towards the red (longer wave) end of the spectrum: (↓Doppler effect). This makes it seem likely that these systems are moving away from us. If they are moving away, the universe (the Galactic System and all the other systems) is expanding (spreading outwards). ↓galaxy.

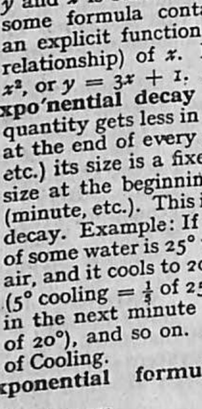
ex'pansion, coefficient of – a fraction showing the increase in length (area, volume) of a substance (e.g. metal, gas, etc.) for each degree of increase in temperature. Thus, for steel the coefficient of expansion is 0·000011. How much longer is a steel bar (e.g. railway line) 40 ft. in length, on a warm day (25° C.) than at 0° C. (freezing point)? Answer: 40 × 25 × 0·000011 feet = about $\frac{1}{8}$th inch.

ex'pectorant (eks'pektərənt) – drug which causes a free flow of liquid in the throat so as to help getting rid of a cold or sore throat.

ex'plicit function (eks'plisit-) – If the relation between two quantities y and x is stated in the form "$y =$ some formula containing x", y is an explicit function (openly stated relationship) of x. Examples: $y = x^2$, or $y = 3x + 1$. ↓implicit.

'expo'nential decay – Sometimes a quantity gets less in such a way that at the end of every second (minute, etc.) its size is a fixed fraction of its size at the beginning of the second (minute, etc.). This is an exponential decay. Example: If the temperature of some water is 25° warmer than the air, and it cools to 20° after 1 minute (5° cooling = $\frac{1}{5}$ of 25); it cools to 16° in the next minute (4° cooling = $\frac{1}{5}$ of 20°), and so on. ↓Newton's Law of Cooling.

exponential formulae – mathematical statements of exponential functions: they are found especially in dealing with calculations about growth, decay and compound interest; e.g. if the starting



EXPONENTIAL FORMULA

number of bacteria is 50 and they double in number every minute, the number after x minutes is 50×2^x. So after 3 minutes the number is $50 \times 2^3 = 50 \times 8 = 400$.

'expo'nential function – Function = relationship, e.g. "$y = 2x$" means "If x is 3, $y = 2 \times 3$". In an exponential function x shows the power, e.g. $y = 2^x$ (y = 2 to the power x).

ex'posure meter (iks'pouʒə -) – instrument for finding out how long the light should be allowed to fall on a photographic film.

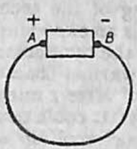
'exsi'ccate ('eksi'keit) – cause to be dry, e.g. cause lard to become dry, e.g. by cutting water channels, etc.; remove water (of crystallization) from a substance.

ex'tenders (iks'tendəz) – "out-pull": substances such as china-clay, silica, barytes, added to paint to make it spread further; also added to plastics to give bulk (make them fill more space).

ex'tension – a pulling out, e.g. of a broken leg so that the bones come into line; the amount of pulling out or stretching.

'exten'someter – instrument used for measuring the increase in length when a metal bar is stretched.

ex'ternal circuit – the part of the electric circuit other than battery (or generator, etc.) itself, i.e. from *A*, round the circuit, to *B*.



EXTERNAL CIRCUIT

extr-/-a-/ ('ekstrə-) – outside, more than usual; e.g. **'extra ga'lactic system** – stars outside the group of stars to which the sun belongs.

ex'trados (ek'streidɔs) – the outside (upper) curve of an arch.

ex'traneous (eks'treiniəs) – from outside, e.g. "a bit of extraneous matter" = an impurity, a bit of dirt in a pure substance.

'extrapo'late ('ekstrəpɔ'leit) – ↓ /-polate.

'extrava'sation of blood ('ekstrævə'seiʃən) – escape of blood from blood-vessels, e.g. a "black eye" (caused by a blow) is an extravasation of blood into the tissue below the eye.

'extra'vert ('ekstrə'vəət) – person who attends to people and things outside himself (not, like an **introvert**, to his own inner thoughts and feelings).

ex'trorse (eks'trɔɔs) – (part of a plant) opening outwards away from the centre.

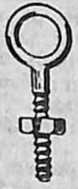
ex'trude (eks'truud) – push a liquid out through a hole, e.g. melted metal or plastic to make bars. **extrusion**, n.

ex'trusive rocks – rocks formed by the solidifying of volcanic liquid pushed up out of the surface.

'exudate ('eksjudeit) – to ooze out like sweat; liquid which comes out through the wall of a diseased or damaged blood-vessel (or organ); gum which comes out from a cut in a tree.

e'xuvia (ek'sjuuviə) – cast-off skin, e.g. of a snake.

'eye-bolt – nut and bolt with a ring in place of the head.



EYE-BOLT

F

f–number of a lens, e.g. f/6 means that the width of the lens is 1/6th of its ↓ focal length.

F – ↓ Fahrenheit temperature: chemical sign for ↓ fluorine.

F layer – layer of air ionized (electrified) by the sun's rays, about 150 miles above the surface of the earth; also called Appleton layer; it reflects short radio waves.

F.M. – frequency ↓ modulation.

f.p. – ↓ freezing point.

F.P.S. units – ↓ foot-pound-second.

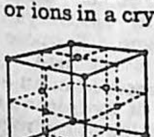
'fabric ('fæbrik) – (of a building) – walls, floors, roof; (of an aeroplane) specially treated cloth used to cover the outside.

'Fabry and 'Perot 'Interfe'rometer ('faabri-'pero) – Interferometer = instrument for measuring wavelengths of light by means of ↓ interference bands. In the F. and P.

instrument circular bands are formed by the passage of light through two flat glass plates which are parallel and very close to each other. ↓ Newton's rings.

face – shape of the letters on printer's type, e.g. Grotesque face: AaBb.

face-centred – arrangement of atoms or ions in a crystal, one atom at each corner of a cube and one in the middle of each face (as in many metals, e.g. aluminium, copper, silver).



FACE-CENTRED

face-plate – (of a lathe) plate to which the work (to be cut) is fixed.

'facet ('fæsit) – flat side of a precious stone. **facet, facette** – raised part between grooves cut on a pillar.

'facia ('fæʃiə) – flat band above a door or window (e.g. of a shop with the name on it); see also fascia.

'facies ('feisi.iiz) – general appearance of the face – e.g. as of a dying man, of a person who has a certain disease.

fa'cilitation (fə'siliteiʃən) – ↓ summation.

fac'simile (fæk'simili) – exact copy, e.g. of a coin.

'factice ('fæktis) – vegetable oils mixed with rubber, e.g. to make rainproof cloth.

'factor ('fæktə) – one of the numbers (expressions, etc.) which when multiplied together produce a given number (etc.); e.g. 3 and 2 are factors of 6.

fac'torial no'tation – Example: factorial 5 (written 5 or 5!); this means the number obtained by multiplying together 1, 2, 3, 4, 5 = 120; factorial 7 = 7! = 1 × 2 × 3 × 4 × 5 × 6 × 7 = 5,040; etc.

factor of safety – amount of extra strength (e.g. in a bridge) beyond what is calculated as the least necessary so as to be quite safe.

factors of growth – conditions which have an effect on the growth of a plant, e.g. soil factors, climate (weather) factors, etc.

'faculae ('fækjulii) – bright areas on the sun, near "sun-spots" (dark areas); the faculae are tops of clouds of burning masses of gas.

'facultative ('fækəl'teitiv) – able to live either in one way or in another, e.g. **facultative 'anaerobe** – organism able to live in air *or* without air.

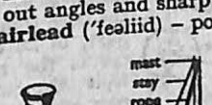
'faeces ('fiisiiz) – waste matter (from digested food) passed out from the bowels.

'Fahrenheit ther'mometer ('færənhait) – thermometer marked with the freezing point of water at 32° and boiling point at 212°. (German, 1686–1736.)

'faience ('faiɔns) – tiles and pottery usually of terra-cotta (red clay) with a dull or glazed surface.

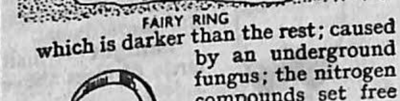
'fairing ('feəriŋ) – making all the lines in the shape of a ship or aeroplane into fair (smooth) curves – smoothing out angles and sharp bends.

'fairlead ('feəliid) – post or ring fixed to the deck of a ship to guide a rope: block tied to a stay (rope holding up the mast) so as to guide a rope.



FAIRLEAD

fairy-ring – circle of grass in a field which is darker than the rest; caused by an underground fungus; the nitrogen compounds set free by the fungus are used by and darken the grass.



FAIRY RING

FALCI—(SICKLE)

falci-/- (fælsi-) – sickle, e.g. **'falciform** beak of an eagle or vulture or other meat-eating bird. **Plas'modium fal'ciparum** – the organism in the blood which causes malignant tertian (the worst form of) malaria.

(PLASMODIUM) FALCIPARUM

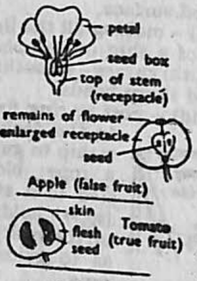
Fa'llopian tube (fə'loupiən) – the tube down which a

FALLOPIAN TUBE

female cell (egg) passes into the uterus (organ in which a child is formed).

fall-out – particles of radioactive substances which fall out of the sky (widely scattered) after they are formed by a nuclear reaction (e.g. in a hydrogen bomb).

false fruit – A true fruit is a developed ovary (seed-container), e.g. the tomato consists of an outer skin, flesh, seeds; the core (centre part) of an apple is the real fruit; the outer part of an apple which we eat is formed from the top of the stem which surrounds the ovary: the apple is a false fruit. So also the fleshy part of a strawberry.



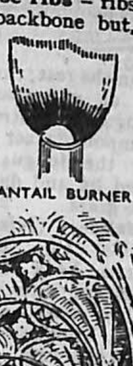
FALSE FRUIT

false ribs – ribs which join on to the backbone but, in front, join other ribs instead of joining the breast-bone.

'fanlight – half circle of glass above a door.

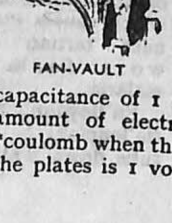
fantail burner – gas-burner as shown.

fantasy – ↓ phantasy.



FANTAIL BURNER

fan-vault – stone ceiling with raised supporting pieces curving out from a centre.



FAN-VAULT

'farad ('færæd) – unit of capacitance (electricity-storing power) of a condenser. A condenser with capacitance of 1 farad can hold an amount of electricity equal to 1 *coulomb when the pressure between the plates is 1 volt. This is a very large capacitance and capacitances are usually stated in very small parts of a farad, e.g. in micro-farads = millionths of a farad. *(coulomb = 1 ampere passing for one second.)

'faraday (f'ærədei) – the amount of electricity (96,500 coulombs, 1 ampere flowing for 96,500 seconds) which sets free in electrolysis 1 gramme of hydrogen. Suppose in electrolysis, zinc is set free. 32½ grammes of zinc dissolved in an acid replace 1 gramme of hydrogen; the equivalent (equal value of hydrogen) weight of zinc is 32½. One faraday sets free one gramme of hydrogen or its equivalent. (British, 1791–1867.)

Faraday effect – the twisting of a beam of ↓ polarized light by a magnetic field.

Faraday's law of electrolysis – (1) The weight of a substance set free in electrolysis is proportional to the current which passes and the time for which it passes; (2) the weight is also proportional to the ↓ equivalent weight of the substance. ↓ faraday.

fa'radic current (fæ'rædik -) – electric current of high voltage (high pressure) but low amperage (small flow), used intermittently (turning off and on very often and very quickly). An "electric shock" coil gives faradic current. **faradism** ('færədizm) – treating disease with such electric current.

'fari'naceous foods ('færi'neiʃəs) – foods made from flour. **farina** (fæ'riinə) – starch made from potatoes or grain.

'fascia ('fæʃiə) – (1) ↓ facia; (2) bands, e.g. the bands which hold together muscle-fibres.

fasci-/ – bundle, e.g. **'fascicle** ('fæsikəl) – many branches or leaves growing close together. **fas'ciculus** (fə'sikjuləs) – bundle of nerves or muscle fibres.

fa'scine ('fæsiin) – bundle of wood, used as a base for a road on soft ground or to protect a river bank.

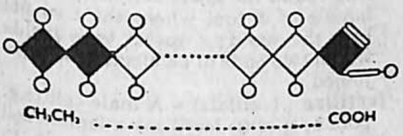
fast colour – colour which does not get weaker (whiter) in sunlight or after washing.

fas'tigium (fæ'stidʒiəm) – highest point of a roof, of fever, etc.

'fathom ('fæðəm) – unit used in measuring depth of the sea = 6 feet; also for measuring wood (= 216 cubic feet, e.g. a heap 6 × 6 × 6 feet).

fa'tigue of metals – failure (breaking) of a metal after it has been pushed or pulled many times, due, e.g., to the development and enlargement of surface cracks.

fatty acids – acids important in fats. The molecules consist of a long chain



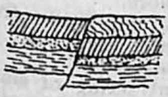
FATTY ACID

of $-CH_2-$ groups with the acid radical (root) $-COOH$ at the end; e.g. stearic acid has sixteen $-CH_2-$ groups: $CH_3(CH_2)_{16}COOH$; three molecules of stearic acid combined with glycerol make meat- (beef) fat. ↓ aliphatic.

'fauces ('fɔɔsiiz) – gateway between the mouth and ↓ pharynx.

'faucet ('fɔɔsit) – water-tap (as used to let water into a bath).

fault – place where rock layers have cracked and slipped, so that a layer does not lie at the same level on each side of the fault.



FAULT

'fauna ('fɔɔnə) – all the animals in a certain place, e.g. the fauna of Britain.

fav-/ (fæv-) – honeycomb (six-sided), e.g. **faveolate, favose, favous** – like the cells of a honeycomb.

'favus ('feivəs) – disease of the skin (especially on the head) caused by a fungus.

fa'yence (fei'ɔns) – ↓ faience.

Fe – chemical sign for iron.

feather – wedge-shaped blade of metal or wood. **'feather file** – file with one sharp edge and the other edge thick.

FEATHER FILE

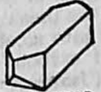
'feathering – turning the blade of an oar in rowing a boat so that it moves back edgeways above or just touching the water; turning the blades of an air-screw so that they do not pull the aeroplane.

'febri'fuge ('febri'fjuudʒ) – medicine for treating fever. **'febrile** ('febrail) – having to do with fever.

feedback (radio) – (1) ↓ reaction; (2) sending back signals about the results of a process into the apparatus, machine, etc., carrying out the process, as a means of controlling it.

'Fehling's so'lution ('feiliŋz -) – liquid used to test if a substance (e.g. urine) contains certain kinds of sugar (e.g. glucose). The solution contains copper sulphate which is changed by the sugar to red-brown copper oxide.

'feldspar, 'felspar ('felspaa) – group of rocks consisting of silicates of aluminium and of another metal (e.g. sodium, potassium, calcium, or barium). Feldspar is a very important rock-forming substance; it forms 52 per cent of granite, 46 per cent of basalt, 18 per cent of shale, 8 per cent of sandstone. Used in making pottery and glass.



FELDSPAR

fell – skin of an animal. **fellmonger** (- mʌŋgə) – worker who prepares skins for leather-making.

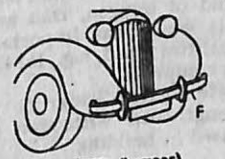
'felloe ('felou) – the outer edge of a (e.g. wooden) wheel round which the tyre is put.

felt – cloth-like material, not woven, but made of hairs closely pressed and mixed together. **felting** – making fibres hold together in this way.

'female thread – spiral cut inside a tube into which a screw can fit.

'femoral ('femərəl) – having to do with the **femur** ('fiimə) – the long upper bone of the leg.

'fender ('fendə) – thing used to keep something away and prevent damage; e.g. round bag

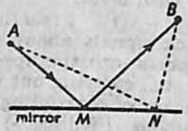


FENDER (bumper)

of pieces of cork put between a ship and the wall as the ship comes near the side; bars or a low wall round a fireplace; bars in front of a motor-car (also called bumper).

fe'nestra (fe'nestrə) – window, **'fenes'tration** – arrangement of windows, doors, etc., in a building.

'Fermat's principle of least time ('fəəmæts -) – The path which a ray of light takes from one point to another is such that the time taken is least, e.g. if a ray of light from *A* is reflected by a mirror to *B*, it takes the path *AMB* which is quicker than taking any other path such as *ANB*.



FERMAT'S PRINCIPLE

fer'ment (fə'ment) – break down a chemical substance by an ↓enzyme with (usually) the giving off of heat and bubbles of gas, e.g. the breaking down of sugar by yeast into alcohol (with the giving off of carbon dioxide). a **'ferment** ('fəəmənt) – substance which causes fermentation.

ferns (fəənz) – group of flowerless plants with feathery leaves. The spores, produced (usually) on the undersides of leaves, give rise to small plants which reproduce sexually and so produce new ferns. ↓alternation of generations.

'ferric, 'ferrous ('ferik, 'ferʌs) – of iron, e.g. ferrous metals. In ferric compounds iron has a valency (joining power) of 3; in ferrous compounds iron has a valency of 2. Thus ferric chloride = $FeCl_3$; ferrous chloride = $FeCl_2$. ↓-ous ↓-ic.

'ferrite ('ferait) – (1) crystals of almost pure iron in the substance of steel or cast iron; ferrite is soft and easily stretched. As the carbon in the steel is increased the ferrite becomes less. (2) compound of oxygen, iron and other metals which has important magnetic qualities; used, e.g., for the ↓cores of a computer.

ferro-'concrete ('fero-'kɔnkriit) – cement strengthened with iron or steel bars, used in building.

'ferro-mag'netic substances – substances which can be magnetized like iron (very strongly); usually containing iron, cobalt or nickel.

'ferro-'prussiate paper (-'prʌsieit) – blue paper used in making photographic copies of plans.

'ferrous – ↓ferric.

'ferru'ginous ('ferju'dʒinəs) – red-brown, like rusty iron.

'ferrule ('ferjul) – a metal ring or cap, e.g. as end-covering for a stick; the ring round the lower end of a wooden handle of a tool where the tool fits into the wood; a metal tube inside which two ends of an electric wire are joined.

'fertilize ('fəətilaiz) – A male cell (e.g. pollen, sperm) fertilizes a female cell (ovum, egg-cell) and causes it to start developing.

'fertilizer – chemical substance put on the soil to make plants grow better, e.g. sulphate of ammonia.

'fetor, foetor ('fiitɔɔ) – very bad smell, e.g. bad breath due to an infected nose and throat; adj. **fetid, foetid.**

'fettling ('fetliŋ) – cleaning up a piece of rough cast metal; cleaning up dirty waste fibres in a spinning room.

'fibre ('faibə) – a single thread, e.g. of a plant, of un-spun silk. **'fibril** ('faibril) – small fibre.

fibre-glass – material made from glass fibre and resin used (e.g.) for car bodies and boats.

'fibri'llation – contracting of single muscle-fibres (or small groups of –) producing involuntary (not willed, not controlled) movements; irregular contraction of muscle fibres in the heart.

'fibrin ('faibrin) – network of fibres formed when blood solidifies (clots).

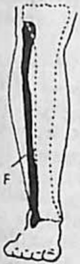
fi'brinogen (fai'brinodʒen) – a substance which exists in the blood in a liquid state; when there is a wound it is changed into a solid, fibrin. ↓thrombin.

'fibroid ('faibrɔid) – composed of fibres or fibre-like substance; **fibroid tumour, fibroma** (fai'broumə) – a tumour (diseased growth) composed of fibres.

fi'brosis = ↓cirrhosis.

'fibro'sitis ('faibro'saitis) – rheumatism (pain and swelling in the muscles, especially of old people).

'fibrous 'tissue ('faibrəs -) – White fibrous tissue is the body substance which holds muscles together and joins muscles onto the bones which they move; it forms the under-layer of the skin, is formed in wounds to repair the damage, forms the mark (scar) left after the wound. Yellow fibrous tissue is much the same, but very elastic; it is found (e.g.) in artery walls.

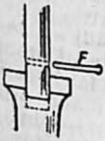


FIBULA

'fibula ('fibjulə) – the smaller bone in the lower part of the leg.

-fic – making, e.g. **'calo'rific value** – power of making heat.

fid – a short (iron) bar put through a beam or pole to prevent it from moving, e.g. used to hold the top-mast or ↓ bowsprit in place.



FID

/-fid – cleft, divided into parts, e.g. **'bifid** – deeply divided into two parts.

fi'delity (fi'deliti) – accuracy of a radio instrument in producing the exact sounds of speech or music.

fi'ducial (fi'djuusiəl) (line – point) – line or point taken as starting place in map-making, in putting the degree-marks on an instrument, etc.

field – the area or space in which forces can be felt, e.g. the **magnetic field** round a magnet; the **electric field** near a Body which has an electric charge; the **gravitational field** near a big mass such as the Earth, sun, etc.

field coil – coil of wire which magnetizes a **field magnet** = electromagnet which makes the magnetic field, e.g. in an electric generator.

/-fier (-faiə) – maker, e.g. **magnifier** – thing which magnifies, causes to appear larger.

'figured 'wood – wood showing the natural markings of its growth; (cloth) having woven figures (ornamental shapes).

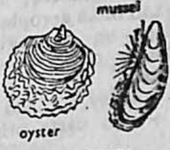
fil-/ – thread, e.g. **'filiform** – like a thread.

'filament ('filəmənt) – (1) fine thread, e.g. the fibre of a silk-worm, the thread-like growths of certain pond-plants (e.g. 'Spiro'gyra); (2) the stem of a stamen (part of flower which produces male cells); (3) the fine wire inside an electric lamp; (4) the fine wire in a radio valve, etc., which gives out electrons when it is heated. ↓ cathode.

fi'laria (fi'laariə) – thread-like worms which live in the body causing disease, e.g. elephantiasis, by blocking the *lymph glands and causing swollen legs or other parts; ↓ hookworm, nematode. *(lymph = clear liquid in the body which joins with the blood-stream.)

'filial 'gene'ration ('filiəl -) – In experiments in cross-breeding (e.g. black mice × white mice) the first filial generation is the first set of children of the cross.

Fili'branchia (fili'bræŋkiə) – ("thread-breathing-organ"): group of shell-fish which includes mussels and oysters.



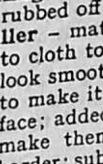
FILIBRANCHIA

Fili'cales (fili'keiliiz). **'Filices** ('filisiiz) – the group of ferns.

'filigree ('filigrii) – ornamental work made with gold or silver wire.

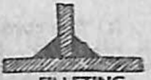
'filings ('failiŋz) – metal powder rubbed off with a file.

'filler – matter (e.g. glue) added, e.g., to cloth to make it weigh more and look smooth; matter added to paint to make it spread over a larger surface; added to rubber or plastics to make them fill more space or be harder; substance used to fill holes in wood; substance rubbed into wood to make a smooth surface before polishing.



FILLET

'fillet ('filit) – flat band standing out from the surface of a stone or piece of metal; small long piece of wood; triangular line of cement in an angle to keep out



FILLETING

water. **'filleting** – filling in part of a right angle between two pieces of metal so as to strengthen the join.

'fillister ('filistə) – groove in the side of a window into which the glass fits; tool for making this groove.

filo-/ – thread, e.g. **'filoplumes** ('failopluumz) – thread-like feathers.

'filter ('filtə) – instrument for separating liquid from solids; instrument (e.g. coloured glass) which allows only light of certain wavelengths (colours) to pass; instrument which separates alternating current of one frequency from another: ↓choke. **filter passing (bacteria), 'filterable (bacteria)** – (bacteria) so small that they pass through any filter; so also **filterable ↓virus. filtrate** – the liquid which goes through a filter. **fil'tration** – separating with a filter.

fin – blade on the side of a fish with which it swims and balances; upright blade of the tail of an aeroplane or airship; blade(s) on an engine (e.g. of the cylinder of a motorcycle) to keep it cool.

'fineness (of gold) – purity, e.g. 800 = 800 parts gold + 200 parts other metal.

FINIAL

'finial ('finiəl) – ornamental top of a tower or roof.

'finings ('fainiŋz) – preparation of fish-glue added to beer to make it clear.

Fink – ↓French truss.

'Finsen lamp ('finsən) – lamp which gives ultra-violet light, used to cure skin disease.

fireball – (1) large, bright shooting-star: ↓bolide. (2) very hot centre of a nuclear explosion.

'fire-clay – clay used to line furnaces.

fire-damp – gas which comes out from coal in a mine and may cause explosions; it consists chiefly of ↓methane.

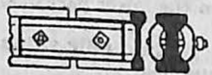
fire-point – temperature at which oil gives off enough vapour for it to go on burning after it is lighted.

FIRMER CHISEL

'firmer 'chisel ('fəəmə-'tʃizəl) – chisel of middle strength; not very light (as for hand carving), not very heavy (e.g. mortise chisel).

first water – best quality (of jewel).

'Fischer 'Tropsch process ('fiʃə-'trɔpʃ) – way of making oil (e.g. petrol) from coal. Carbon monoxide (made from the coal) is passed with hydrogen over a ↓catalyst; the carbon and hydrogen combine to form the oil. The usual catalyst consists of cobalt and thorium oxide.



FISH PLATE

'fish plate – plate fixed to the side of two railway lines to hold their ends together. **fish joint** – joint so made with plates.

fiss-/ – split. **'fissile** ('fisail) – able to be split. Used especially of atomic nuclei which can be split fairly easily into two smaller nuclei and other particles. **'fission** ('fiʃən) – splitting into two, e.g. of a cell, of a star, of the nucleus of an atom. **fission products** – the substances formed by the splitting of atomic nuclei.

'fissi'ped – with separate toes (not all in one as in a horse).

'fissure ('fiʃə) – a crack e.g. in rock, in the skin.

'fistula ('fistjulə) – a path (caused by a wound or by disease) by which liquid (e.g. urine or matter from the bowels) gets out to the surface (not by its proper outlet).

FITCH

fitch – a small stiff paint-brush used for painting fine lines, properly made of the stiff hairs of a cat.

'fitter – workman who fits together the finished parts of an engine.

Fitz'gerald – ↓Michelson-Morley.

fix – position of a ship or aeroplane on a chart (map) as shown by two or more lines cutting each other: the positions of these lines may be found from land-points, by means of radio, or by the stars.

fix (photographic film) – treat with "hypo" (sodium thiosulphate, $Na_2S_2O_3$) so that the rest of the silver bromide (not affected by light) is dissolved away: (if this is not done it will go black as soon as the film is taken into the light).

fi'xation – stopping of the growth of the mind and character at a certain stage so that the person remains (when grown up in body) still a child in character.

fixation of nitrogen – fixing nitrogen in a chemical compound so that it can be used; e.g. by combining nitrogen with hydrogen to make ammonia; fixing of nitrogen by bacteria on the roots of beans.

'fixative – liquid used to fix a dead creature for show in a collection; or to fix a chalk-picture so that it does not rub off, e.g. with resin dissolved in alcohol.

fixed points (of a thermometer) – temperatures to which numbers have been fixed so that the scale of a thermometer can be made, i.e. the melting point of ice (0° C., 32° F.) and the boiling point of water at barometer pressure 76 cms. of mercury (100° C., 212° F.).

fixed stars – the ordinary stars (not planets, etc.) which do not seem to change their positions in relation to each other.

fixing block – sponge-like brick, or wooden brick built into a wall so that something may be screwed on to it.

'flabell-/- ('flæbel-) – fan, e.g. **'flabellate, 'flabelliform** – shaped like a fan.

'flaccid ('flæksid) – soft, loose (e.g. flaccid muscles in a sick person).

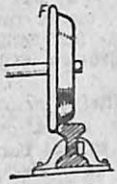
'flagel-/ ('flædʒel-) – whip. **'flagellate** – having long moving threads used (e.g.) for swimming.

'flake-white – white-lead paint.

Bacillus typhosus

FLAGELLATE

flange (flændʒ) – edge which stands out from the main surface, e.g. of railway wheel so that the wheel stays on the line.



FLANGE

flap – hinged back part of an aeroplane wing, used to change the camber (curved shape) of the wing, e.g. when landing.

flare, 'flaring (fleə) – trumpet-like ending of a pipe.

flash – thin layer of metal (or plastic) which gets in between two parts of a mould and is cut away from the finished article. **flashings** – waste material so cut away.

'flash boiler – coil of very hot tube into which a very small amount of water is pumped; the water becomes steam at once.

'flashing – (1) see flash; (2) sheet of lead put round, e.g., the base of a chimney so that water does not run in under the roof.

flash-over – the jumping of electricity through the air (or other insulator) between two parts of electric apparatus, or from the apparatus to earth, so causing a spark. In a **flash-over test** the voltage (electric pressure) is found at which a spark is made.

flash-point – the temperature at which an oil (e.g. paraffin, kerosene) gives off enough vapour to make a small flash but not catch fire if a flame is put near it. ↓ fire-point.

flat (paint) – not having a shiny polished surface.

flat spin – spin = uncontrolled spiral downward movement of an aeroplane; flat spin – spin in which the aeroplane is not pointing sharply down at the ground.

flat spot (in driving a car) – point at which letting in more petrol vapour gives a bad air-petrol mixture so that the car does not go any faster.

'flatter – hammer with a wide face which is put on a piece of hot metal and struck with another hammer.

'flatulence, 'flatus ('flætjuləns, 'fleitəs) – air in the stomach or bowel.

flav-/ – yellow, e.g. **'flavone** ('flævoun) – yellow colour-substance in plants.

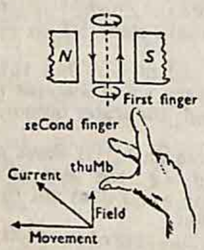
flax – The fibres of the outer covering of the stem of the linseed plant are

FLAX

made into flax; flax is spun and made into linen (e.g. for tablecloths, bedsheets, sails, etc.).

flèche (fleʃ) – arrow, thing like an arrow, arrow-like tower; band of white hair among dark hair on a person's head.

'Fleming's rules ('flemiŋz) – If a coil of wire turns in a magnetic field (between ends of a magnet) a current is produced in it. The **right-hand** rule tells in which direction the current flows. If the current turns an electric motor the **left-hand** rule tells the direction in which the motor turns. (The direction of the field is from N. to S.). **Fleming valve** – another name for a ↓ diode. (British, 1849–1945.)

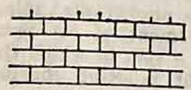


FLEMING'S RULES

'flemish a rope – put a rope on the deck in a neat spiral or figure 8.

FLEMISH

'Flemish bond – way of laying bricks as shown.



FLEMISH BOND

'fleshing ('fleʃiŋ) – cutting away the flesh from a skin so as to make leather.

'fletton ('fletən) – light yellow-red brick with a deep mark on one side.

flex-/ (fleks-) – bend. **flex** – electric wire made of many thin wires twisted together. **'flexible** – easily bent. **flexion** ('flekʃən) – bending.

'flexor – muscle which causes an arm (leg, etc.) to bend, e.g. the inside muscle of arm; the **extensor** muscle straightens it out.

'flexure ('flekʃuə) – the bending of a beam under a weight, e.g. **flexural strength** (test of –) – test of resistance of a beam to bending if it is held up at the two ends and a weight is put on the middle.

FLINDERS BAR

'Flinders bars ('flindəz) – bars of soft iron in a brass box fixed on to the outside of the wooden stand of a ship's compass so as to overcome the magnetic effect of iron in the upright parts of the ship, e.g. mast, funnel, etc. (The cross magnetic effect is overcome by magnets put into the stand.)

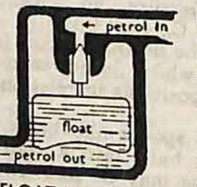
flint – very hard glass-like stone formed of silica (? fossilized sponges) found in chalk.

flint, lighter-flint – small bar of cerium (a metal element) used to make a spark in a cigarette lighter.

flint-glass – very clear glass; so called because once made from flints.

flip-flop – kind of electric circuit, using radio valves, which is ↓ bi-stable.

float – (1) small box (containing air) which floats up on the petrol in a ↓ carburettor and shuts off the flow from the tank (petrol container) when the right level is reached; (2) thread which passes over other threads in a piece of cloth; (3) cart with the body set very low on small wheels. (4) flat piece of wood with handle at the back used for spreading plaster on walls; (5) piece of stone or iron used for rubbing the surface of bricks or building-stone smooth.



FLOAT (carburettor)

FLOAT (plaster)

floating kidney – When a person becomes very thin, there is a loss of the hard fat which helps to hold the kidney and other organs in place; so the kidney hangs loose, causing pain and ill-health; (but the condition is sometimes only imaginary).

floating ribs – 11th and 12th ribs, which do not join up with the breast-bone or other ribs.

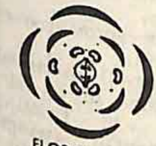
FLOATING RIBS

floats – (1) air-containers (instead of wheels) on an aeroplane which comes down on, and goes up from water (sea-plane); (2) footlights (lamps level with the floor along the front of the stage in a theatre).

flocc-/ – wool, like wool. **'flocculent** (liquid) – having in it matter which looks like wool (or snow).

flocs – masses of bacteria and single cell organisms formed in the ↓activated sludge system of getting rid of sewage (drainage from a town).

flong (flɔŋ) – wet paper sheets pressed on to printer's type to make a mould of it for casting a plate (from which the printing is done).

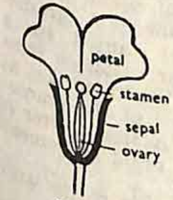


FLORAL DIAGRAM

flor-/ – flower.

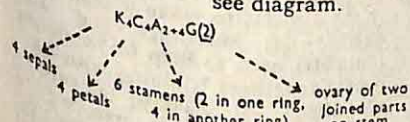
fl'ora ('flɔɔrə) – all the plants in a certain area of country.

'floral 'diagram ('flɔɔrəl -) – diagram to show the numbers and arrangement of parts (e.g. petals) in a flower.



Flower shown in Floral Diagram

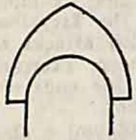
'floral 'formula – way of stating the numbers of the parts in a flower; e.g. K_4, C_4, A_{2+4}, $G(2)$; see diagram.



K4C4A2+4G(2)
4 sepals
4 petals
6 stamens (2 in one ring, 4 in another ring)
ovary of two joined parts on stem above petals

FLORAL FORMULA

'Florentine arch ('flɔrəntain -) – arch circular inside and pointed outside.



FLORENTINE ARCH

'floret ('flɔrit) – one small flower in a flower-head made of a close group of flowers.

'florigen ('flɔridʒen) – substance believed (but not yet proved) to be produced in the leaves of plants when day and night are of a certain length; it has been thought that the substance causes the plant to produce flowers.

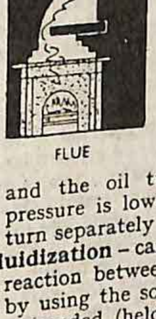
flotation process – way of separating (e.g.) zinc from other matter by making it float on the surface of liquid.

flowers of sulphur – fine powder form of sulphur.

flow sheet – a plan showing how a piece of material or a substance moves through the various workshops or processes from start to finish.

'fluctuate ('flʌktju.eit) – go up and down like a wave; become weaker and stronger in waves.

flue (fluu) – smoke passage in a chimney.



FLUE

'fluid ('fluuid) – a substance which flows – a liquid or gas.

fluid clutch (- klʌtʃ) – instrument used to join (or free) the gear and engine of a motor-car. It consists of two wheels in a closed oil-container; when the pressure of oil is increased the wheels and the oil turn together; when pressure is lowered the two wheels turn separately in the oil.

'fluidization – carrying out a chemical reaction between a gas and a solid by using the solid as a fine powder suspended (held up) in the gas so that the whole behaves as a fluid; the process is used especially in petroleum manufacture.

FLUKE

fluke (fluuk) – common name for the Trematode worm which attacks the livers of sheep. ↓cercaria.

flukes – the ends of a ship's anchor.

FLUKES

flume (fluum) – channel made of wood or metal for carrying liquid, e.g. water to a water-wheel.

'fluon – a plastic made from ↓fluorohydrocarbons; it is not dissolved by any ordinary solvent (liquid).

'fluorescein ('fluə'resiin) – red crystals (of resorcinol-phthalein) whose solution glows green when a beam of light passes through it.

'fluo'rescent substances – substances which take in energy from, e.g., X-rays or ↓ultra-violet light, hold the energy for a very short time (part of a second), then send out the energy in the form of light which can be seen. (Example – the "screen" of a television set.) *Note* – A phosphorescent substance gives out light for some time after the exciting rays have ceased.

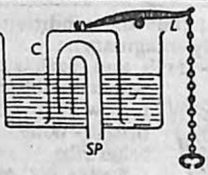
'fluori'dation – adding of small amounts of fluorides (compounds of ↓fluorine) to drinking water as a means of helping to prevent tooth decay.

'fluorine ('fluɔriin) – element; a yellow gas which attacks almost everything except dry glass below 100° C. ↓hydrofluoric acid.

'fluorohydro'carbons – First see hydrocarbons: fluorohydrocarbons are similar but with fluorine in the place of hydrogen, e.g. propane $CH_3CH_2CH_3$, perfluoropropane $CF_3CF_2CF_3$. They are very resistant to heat and chemical action, are used as lubricants (oils, greases) in high-temperature engines, also to put out fires. Some are used for making plastics. ↓polytetrafluoroethylene.

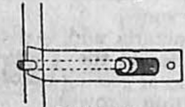
'fluor'spar – cubic crystals, usually purple, of calcium fluoride, CaF_2.

flush – (1) to clean a pipe by sending in a large amount of water down it in a sudden rush; (2) noun; also called **waste-preventer** – instrument used to wash out a W.C. (lavatory). When the chain is pulled down, the lever *L* raises the bell-shaped container *C*; the pressure of the atmosphere causes the water in *C* to go up with *C* so that the water comes above the bend of the Siphon *Pipe*. The water then flows down the siphon pipe in a rush.



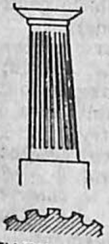
FLUSH (waste-preventer)

flush with – level with. **flush bolt** – a sliding bar for closing a door fixed so that its case is level with the surface of the door.



FLUSH BOLT

'fluted 'pillars ('fluutid –) – pillars cut with long circular grooves.



FLUTED PILLAR

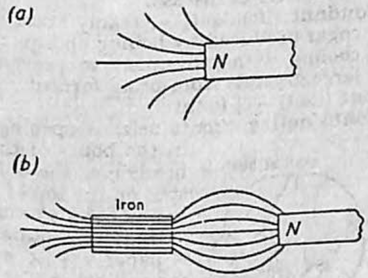
flutes – spiral grooves in a drill.

'flutter – (1) unwanted vibrations in an aircraft, e.g. twisting movement of the wings. (2) imperfect reproduction of sound from a machine (e.g. gramophone) caused by a regular variation from the proper pitch of the sound (e.g. as by an uneven speed of the gramophone turntable). A slow flutter is called a **wow**. (3) rapid movement of the heart.

fluv-/- (fluuv-) – having to do with rivers, e.g. **fluvial**, adj.

flux (flʌks) – (1) substance added to (e.g.) a metal to make it melt more easily; (2) substance (e.g. zinc chloride) used to help in *soldering metal together: *(joining with lead-tin alloy); (3) ↓assay; (4) rate of flow through a given area, e.g. of light (↓lumen), of neutrons; (5) **magnetic flux** – (roughly) the total amount of magnetic power passing through an area, e.g. through the coil of an electric generator. (It is measured by the number of lines of ↓induction passing through the area at right angles, or by multiplying the strength of the field by the area through which the field passes.) See also flux density. Similarly **electric flux.**

flux density (magnetic) – In (*a*) the lines of force (= lines of induction) from the magnet are in air. In (*b*) a piece of iron is placed near the magnet. The lines crowd through the iron: the flux density in the iron is greater. Flux density is measured by the number of lines which pass through 1 square centimetre at right angles. The unit is the gauss. Flux-density is also called "induction".

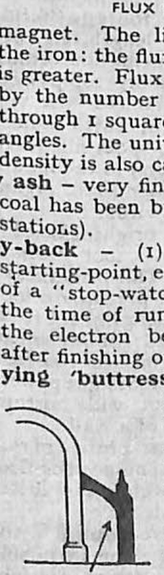


FLUX DENSITY

fly ash – very fine ash collected after coal has been burned (e.g. in power stations).

'**fly-back** – (1) quick return to starting-point, e.g. of the centre hand of a "stop-watch" (used in taking the time of runners); (2) return of the electron beam in ↓television after finishing one line of picture.

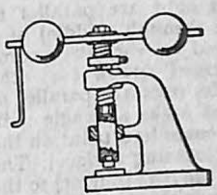
'**flying 'buttress** ('flai.iŋ-'bʌtris) – half-arch pressing in against the foot of another arch or a wall so that it may not fall outwards.



FLYING BUTTRESS

'**flyleaf** – unprinted page at the beginning or end of a book.

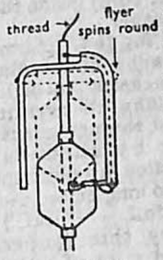
'**fly-nut** – nut with wings so that it can be screwed on by hand.



FLY-PRESS

'**fly-press** – press for cutting holes (etc.) The worker gives a sharp push or pull to the two heavy balls at the top and they fly round till the tool touches the work; then another pull cuts the hole.

'**fly-shuttle** – part of a loom (for weaving cloth) which throws the *shuttle from side to side: *(pointed box containing roll of thread from which the cross threads are drawn).



FLYER

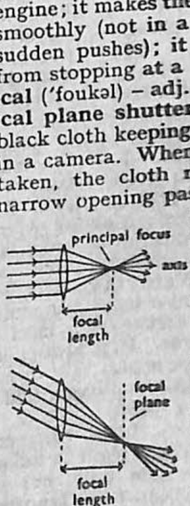
'**fly-spinning** – spinning thread on a **fly-frame.** The **flyer** turns round and winds the thread on to the bobbin: the bobbin does not turn, but moves up and down.

'**fly-wheel** – heavy wheel which carries on each impulse from an engine; it makes the engine run more smoothly (not in a number of hard sudden pushes); it also prevents it from stopping at a ↓dead angle.

'**focal** ('foukəl) – adj. of ↓focus.

'**focal plane shutter** – long piece of black cloth keeping light off the film in a camera. When a photograph is taken, the cloth moves so that a narrow opening passes quickly over the front of the film so letting the light through: used to photograph quickly moving things.

'**focus** – When a beam of light, electrons, etc., is made to come to a point, it is said that the beam is **brought to a focus** (= focused). If the rays



FOCUS

of a beam of light are parallel to **the axis (line through** middle) of a **lens (or curved mirror)** they come **to the principal focus** (= "the focus"). **If the rays** are parallel to **each other but make** an angle with **the axis they come to** a point on the **focal plane (focusing** surface). The **distance from the lens** (mirror) to the **principal focus is the focal length.**

focus of a curve – ↓ellipse, ↓hyperbola, ↓**parabola.**

FOETUS

'foetus ('fiitəs) – **young** animal (not **yet** born) inside the **mother.**

'fogged (photographic film) – film **blackened** by light **falling** all over it, **not** through a lens; **or** by chemical **action** in a film kept **too long** before use.

foil – ("leaf"): **very** thin (paper-**like**) piece of metal.

trefoil window -/FOIL

/-foil – e.g. **'trefoil 'window** ('trefɔil -) – **window** made up of **three** leaf-like parts **like** a three-leaf **plant,** e.g. clover.

foli/- ('fouli-) – **leaf,** e.g. **'foliage** – all the leaves **of a tree. 'foliated** – with **plates arranged** like leaves, e.g. mica; **having leaves;** having ↓foils.

'folic acid (**'foulik** -) – substance **found in certain green** leaves (e.g. **spinach), also in yeast** and liver. The **name is also loosely** used for several **similar compounds,** all of which act **as vitamins (B group).** Folic acid **causes increased growth** of cells, e.g. **of blood cells, also** increased multi**plication of bacteria.** It is used as a cure for ↓**sprue.** It is also called **'pteroylglu'tamic acid.**

'folio ('fouliou) – piece of paper folded **once (so giving 4 sides).**

'follicle ('fɔlikəl) – little bag, e.g. **containing seeds on a plant**: a follicle **opens down one side** only, not on **both sides like a bean**-pod. **Graafian follicle** (**'greifiən**) – small sac (bag) on the inner surface of the ovary (female organ); in it the unfertilized ovum (egg cell) is formed. It is full of liquid; the ovum grows in it, and when ready, breaks out and passes through the Fallopian tube into the uterus (organ of childbirth).

(GRAAFIAN) FOLLICLE

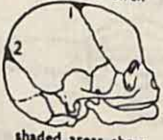
'fomites ('foumaits) – things such as clothes, toys, books which might act as carriers of disease.

'fondant ('fɔndənt) – creamy state of sugar produced by boiling and quick cooling with movement to prevent large crystals from being formed.

font (fɔnt) – ↓fount.

'fonta'nelles ('fɔntə'nelz) – openings in the bones of the head, e.g. the soft spot on the top of a young baby's head.

skull at birth



shaded areas show fontanelles

FONTANELLE

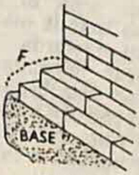
'foolscap paper – paper 13½ × 16 (or 17) inches.

'footage ('futidʒ) – length, e.g. of a cinema film, of musical organ-pipes, etc.

foot and mouth disease – a very infectious disease of cattle, sheep, pigs, goats, causing spots filled with a clear liquid (blisters) in the mouth, on the feet and udder (milk organ). It is caused by a ↓virus.

foot-candle – the brightness of a surface which is 1 foot from a *Standard Candle. This brightness is equal to 1 ↓lumen per square foot. For reading and writing light of 10–20 foot-candles is needed; for fine sewing or reading small print, 50–100 foot-candles. *(agreed unit of light power).

footing – base, bottom; wide bottom-part of a wall.



FOOTING

foot-plate – of railway engine: the floor on which the driver stands.

foot-pound – the work done in raising one pound weight straight up through one foot of height.

foot-poundal – unit of work, equal roughly to the work done when a weight of $\frac{1}{32}$ lb. (= $\frac{1}{2}$ oz.) is raised straight upwards through 1 foot = the work done when a force of 1 ↓poundal moves through 1 foot.

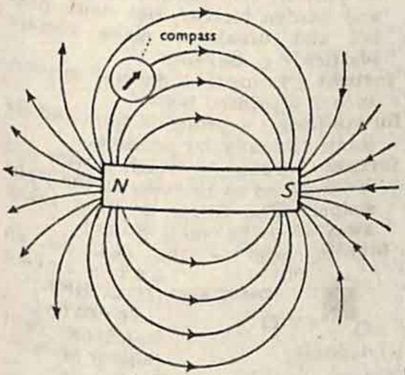
foot-pound-second units – units which are based on the British units of length (foot), mass (pound), time (second): e.g. horse-power (33,000 foot-pounds per minute). ↓C.G.S. units.

fo'ramen (fɔ'reimen) – opening, e.g. in a bone.

Fo'rami'nifera (fɔ'ræmi'nifərə) – very small, one-cell animals in the sea, so called because they have chalky shells with little holes (foramina) in them; their fossilized remains are of importance in discovering the date of ancient rocks.

FORAMINEFERA

force, lines of – The forces in a magnetic or electric field are represented by lines of force. A compass needle lies along a line of force in a magnetic field. The strength of a magnetic field is described by the number of lines of magnetic force; for this purpose scientists suppose a certain number (4π) of lines to start from every ↓unit magnetic pole (pole of a certain standard strength).

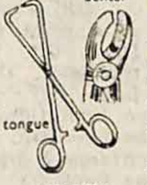


LINES OF FORCE

forced draught (- draaft) – air forced through the fire of an engine to make it burn hotter.

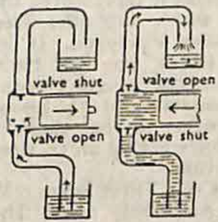
forced osci'llations – swings of alternating electric current (caused by an alternating supply) at a frequency other than the natural frequency of the circuit. If the supply forces oscillations at the natural frequency, a very strong current flows. ↓acceptor circuit, forced vibrations.

forced vi'brations – Example: If you push a pendulum so that it swings faster (or slower) than its natural speed, you force it to swing or vibrate. If you push at the natural speed, the pendulum swings very widely. ↓resonance.



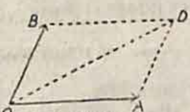
FORCEPS

'forceps (fɔɔseps) – scissor-like instrument used for holding a thing tightly with the hand (e.g. dental 'forceps – for holding a tooth to pull it out). **forcipate** – shaped like forceps.



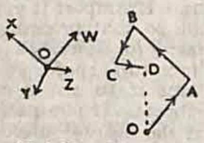
FORCE-PUMP

force-pump – An ordinary pump draws up liquid and lets it fall out; a force-pump has a double action: it draws up liquid and forces it out, e.g. to a container at the top of the building.



FORCES (PARALLELOGRAM OF)

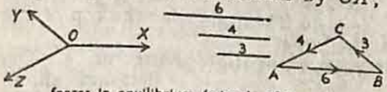
forces, parallelogram of – The diagram shows two forces *OA* and *OB* pulling on a Body at *O* (e.g. the force due to the engine, and force due to the wind, acting on a ship). These two forces are equal to one force pulling in some direction between them. This one force is the **resultant**. The parallelogram of forces is a way of finding the strength and direction of the resultant. Draw *OA* and *OB* so that lengths represent strengths of forces. From *A* draw a line parallel to *OB*, from *B* draw a line parallel to *OA*. These lines meet at *D*. The figure *OADB* is a parallelogram. Then the line *OD* represents the resultant; its length tells the strength of the resultant, and it shows the direction.



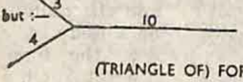
POLYGON OF FORCES

forces, 'polygon of – You wish to find the resultant (see above) of several forces (e.g. *OW*, *OX*, *OY*, *OZ*) acting at a point *O*. Draw *OA* to represent the force *OW* in strength and direction; from *A* draw *AB* to represent the force *OX* in strength and direction; from *B* draw *BC* to represent the force *OY* in strength and direction, and so on. Then the resultant is represented by *OD*. A figure with many sides, like *OABCD*, is called a polygon. If, in drawing the forces, you get back exactly to *O*, i.e. the polygon is complete, there is no resultant: the forces balance each other so that there is no resultant force acting on *O*: they are in equilibrium.

forces, triangle of – Three forces *OX*, *OY*, *OZ*, act on a Body at *O*. The force *OX* is shown (in strength and direction) by *AB*; force *OY* is shown by *BC*; force *OZ* is shown by *CA*; here we get a closed triangle; the forces acting on *O* are in equilibrium (balance each other). Three forces acting at a point are in equilibrium if they can be represented by the sides of a triangle taken in order (i.e. going the same way round, *A* to *B* to *C*).



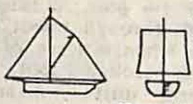
forces in equilibrium (triangle of forces)



(TRIANGLE OF) FORCES

forcip-/ – ↓ forceps.

fore and aft rig – way of fixing the sails longways to the ship, not on poles fixed across the mast (= square rig).



FORE AND AFT RIG

'foreshore – the piece of land left uncovered when the tide goes down.

'foresight – (of gun): the small blade up-standing at the open end of the barrel which must be in line with the **back-sight** (nearer the firer) when aiming.

FORESIGHT

forge – place where hot metal is hammered and pressed into shape.

for'maldehyde (fɔɔ'mældihaid) – HCHO, a colourless gas which, dissolved in water, becomes **formalin**: (trade name outside U.K.). Formalin is used as a disinfectant, to prevent bad smells, to contract and harden leather, also (with phenol and urea) to make certain plastics, e.g. Bakelite.

HCHO

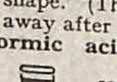
FORMALDEHYDE

'format ('fɔɔmæt) – general appearance of a printed book.

forme (fɔɔm) – printer's type and its frame all ready for printing.

former – frame on which a wire coil is wound so as to make it the right shape. (The frame is often taken away after the coil is made.)

'formic acid – the acid in an ant's sting (H.COOH).


H.COOH

FORMIC ACID

forming – bending (not pulling or beating) metal into shape.

'formula ('fɔɔmjulə) – (1) (chemical): set of letters showing the atoms (elements) of which a chemical compound is made, e.g. water = H_2O (Hydrogen – 2 atoms; Oxygen – 1 atom) and sometimes (in a **graphic formula**) by an arrangement of the letters showing how the atoms are joined: (2) (mathematical) – a scientific rule or law expressed mathematically. Also see floral formula.

'forti'fication of food – adding vitamins and other substances to bread-flour (or other food in general use) to give better food-value, and to make sure that people get in their food all the substances necessary for health.

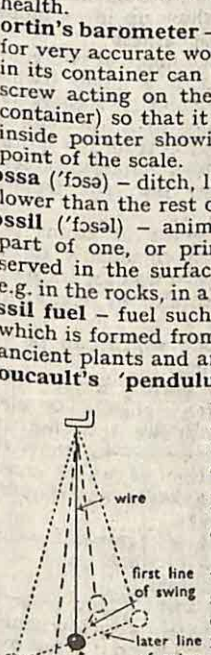
'Fortin's barometer – barometer used for very accurate work: the mercury in its container can be moved (by a screw acting on the bottom of the container) so that it just touches an inside pointer showing the o (zero) point of the scale.

'fossa ('fɔsə) – ditch, line of substance lower than the rest of the surface.

'fossil ('fɔsəl) – animal or plant (or part of one, or print of one) preserved in the surface of the Earth, e.g. in the rocks, in a stone-like form.

fossil fuel – fuel such as coal and oil which is formed from the remains of ancient plants and animals.

Foucault's 'pendulum ('fuukoltz-) – a heavy ball swinging to and fro at the end of a very long wire. As the Earth turns, the pendulum is seen (after some time) to be swinging on a different line from where it started because the Earth might be said to have "moved round under it". The swinging pendulum keeps to its line of motion in spite of the movement of the Earth; compare a ↓gyroscope.



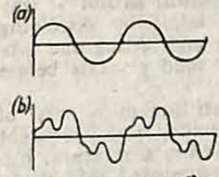
FOUCAULT'S PENDULUM

'foulard ('fuulaad) – very light silk or cotton cloth with a printed design on it.

'foundry ('faundri) – place in which metal is melted and cast.

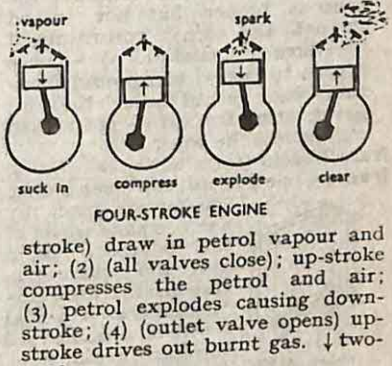
fount, font of type (faunt, fɔnt -) – one whole set of type of one kind and size.

'Fourier's theorem ('furiei -) – Curve (*a*) shows a simple wave: (it is a ↓sine curve). Curve (*b*) shows a complicated wave. Fourier's theorem shows in mathematical language that (with certain uncommon exceptions) a complicated curve can be dealt with as the combined effect of a number of different sine curves. The process of finding the necessary sine curves is called Fourier analysis, or ↓harmonic analysis.



FOURIER'S THEOREM

four-stroke engine – a petrol engine which works in this way: – (1) (down stroke) draw in petrol vapour and air; (2) (all valves close); up-stroke compresses the petrol and air; (3) petrol explodes causing down-stroke; (4) (outlet valve opens) up-stroke drives out burnt gas. ↓two-stroke.



FOUR-STROKE ENGINE

'fovea ('fouviə) – small spot on the surface of the body lower than the rest of the surface; (of eye) – a part of the ↓yellow spot which is lower than the rest.

'Fowler position ('faulə -) – position in bed after operation on the abdomen (lower part of body containing digestive organs)–sitting up and leaning back so that liquids do not flow up into the upper part of the abdomen.

(BED FOR) FOWLER POSITION

foxed – (paper, wool): having red

marks on it caused by a certain kind of decay.

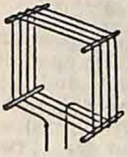
'fractional 'crystalli'zation – way of separating solids by dissolving them in water and letting one substance reform solid crystals before the other.

'fractional 'disti'llation – way of separating liquids with different boiling points from a mixture; e.g. natural oil is separated into many kinds of oil – petrol (low boiling point, easily vaporized), kerosene (lamp oil), heavy engine oil . . . down to the solid material of candles. The different vapours condense (change back into liquid) in a **fractionating column.**

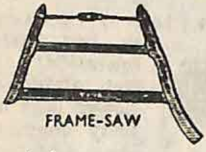
'fracture ('fræktʃə) – breaking, e.g. of a bone; in a **simple 'fracture** the bone is broken but not pushed through the skin; **'comminuted 'fracture** ('kɔminiutid -) – bone broken to pieces; **compound fracture** – bone pushed through the skin; **green-stick fracture** – not broken right across the bone.

fram'boesia (fræm'biiziə) = ↓ yaws.

frame – one picture on a cinema film; the picture made by one complete travel of the television beam over the square picture-glass. **frame an'tenna, frame 'aerial** – wire on a frame used to receive radio; when the frame is edge on to the sending-out station the effect is strongest: in using a frame aerial to find the direction of a signal the position of minimum (least) strength is used.



FRAME AERIAL



FRAME-SAW

frame-saw – a thin saw blade in an H frame; the tops of the H are tightened with a string.

FRAPPING

'frapping – binding two pieces of rope together with string so as to make both pull more tightly; done (e.g.) in lashing (tying) two poles together.

frass (fræs) – waste matter from the bowels of insects.

'Fraunhofer lines ('fraunhɔfə -) – dark lines in the spectrum of the sun caused by the absorbing of light by the cooler gases round the very hot centre. (German, 1787–1826.)

free association test – Starting with a given word the person says whatever word comes into his mind. The test helps to show up ideas hidden below the consciousness.

freemartin – the female of two young cattle born, with a male (twins), which develops some male characters because it shares with the male the same blood-supply from the mother and some male-character-producing ↓ hormones get into the female's blood.

ee radical – group of atoms (e.g. $-NH_2$) which is chemically incomplete but can exist as a separate unit under special conditions (e.g. at low temperatures).

'freestone – stone which can be cut without splitting it.

freeze-drying – getting water out of a substance (e.g. plasma = clear liquid of blood) by lowering the atmospheric pressure so that the rapid evaporation of water causes freezing. The substance is thus not damaged by heat.

'freezing point – temperature at which a liquid becomes solid, or a solid becomes liquid.

'fremitus ('fremitəs) – ("low noise"): rough feeling (as of a very low sound) felt with the hand when it is put over the lungs or heart in certain diseased conditions.

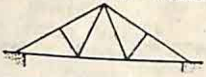
French arch – flat arch built with ordinary (not V-shaped) bricks; also called ↓ Dutch: see Dutch for picture.

French chalk – very fine white powder of talc (mineral of which some face-powder and baby-powder is made).

French curve – a piece of wood with edges cut in various curves as a help in drawing.

French polish – *shellac dissolved in alcohol rubbed on to wood to give it a fine glass-like polish: *(hard, resin-like material produced by insects).

French truss – framework of beams, based on the simple form shown, used for supporting a roof of wide span; also called Fink.



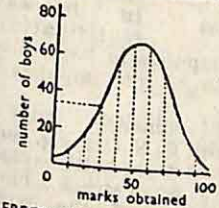
SIMPLE FRENCH TRUSS

'freons ('friiɔnz) – compounds of carbon, chlorine and fluorine used in freezing machines; they have a low boiling point, are not poisonous and do not catch fire.

'frequency ('friikwənsi) – number of things (e.g. sound waves, electric waves, etc.) per second.

frequency changer – a radio valve used in a ↓superheterodyne radio to change the high frequency of the currents produced by the waves into a lower, more easily used frequency.

frequency distribution curve – curve showing how things are distributed (spread out), e.g. how the marks in an examination are spread out among the boys (how many boys got . . . marks), how many people are . . . inches high, how many have £ . . . a year, etc.

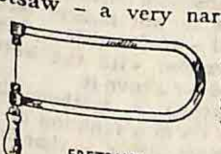


FREQUENCY DISTRIBUTION

frequency modulation – ↓modulation.

Fresnel biprism ('freinel-'baiprizm) two very thin prisms placed together, used to make ↓interference fringes.

fretsaw – a very narrow saw-blade used to cut out a design from thin wood. **fretwork** – wood so cut.



FRETSAW

Freud's theory, 'Freudian (frɔidz -, 'frɔidiən) – Disorders of the mind are caused by some event or trouble or conflict (battle) of desires, usually of a sexual nature, which was not properly faced at the time. The conflict, instead of being dealt with, was pushed down, out of the consciousness. As an unconscious "memory" it goes on disturbing the mind. It may show itself in some half-hidden form in dreams or in some strangeness of behaviour. The work of the doctor is to help the sufferer to find this hidden trouble and face it. ↓censor, ego, superego.

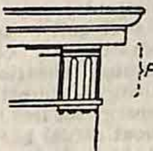
'friable ('fraiəbl) – easily broken into little pieces, e.g. a biscuit is friable.

'Friar's balsam ('fraiəz-'bɔɔlsəm) – ↓benzoin (with certain other substances) in alcohol; it is mixed with hot water and the steam is breathed in to ease difficulty in breathing; also used on sore places.

'friction ('frikʃən) – force which tries to stop one thing from sliding over another, e.g. the force which tries to stop a Body from sliding down a slope, or an axle from turning in its bearing. A force greater than a certain amount (called the **limiting friction**) overcomes the friction and causes movement. The limiting friction is equal to the force between the surfaces (e.g. the weight of one Body resting on another) multiplied by a certain number called the **coefficient of friction.** The coefficient of friction is different for different substances and surfaces.

frictional electricity – electricity produced by rubbing glass (sealing-wax, etc.) with silk or fur (cloth, etc.).

frieze (friiz) – middle part of the wall carried on the top of pillars, often carved or painted; ornamented top edge of the wall inside a room.



FRIEZE

frit – mixture of prepared sand, powdered glass and powdered flint used to give a glass-like waterproof surface to bricks; also added to clay in certain pottery.

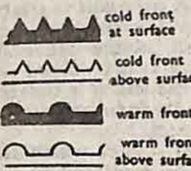
frog – hollow part in one side of a brick; V-shaped piece in centre of the underside of a horse's hoof; V-shape piece in railway lines where they cross.

FROG

'Fröhlich's 'syndrome ('froliks 'sindroum) – very great fatness and undeveloped sex, caused by disorder of the ↓ pituitary gland.

frond (frɔnd) – leaf of a fern.

front (frʌnt) – boundary between two different (e.g. warm-cold) masses of air; example, **cold front** – mass of cold air pushing warm air upwards and so causing weather changes. **warm front** – front edge of a mass of warm air coming in place of a mass of colder air.



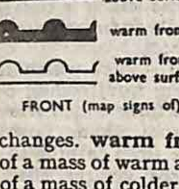
FRONT (map signs of)

fruct-/ – fruit, e.g. **'fructifi'cation** ('frʌktifi'keiʃən) – (1) the body which forms after fertilization and contains seeds or spores; (2) any spore-bearing structure of a lower plant.

'fructose ('frʌktous) – fruit-sugar.

frug-/ – fruit, e.g. **fru'givorous** (fruu'givərəs) – fruit-eating.

'frustum ('frʌstəm) – the part of a solid left if the top is taken off, e.g. by a cut parallel to the base.



FRUSTUM

'fuchsine ('fuksin) – dark red dye (magenta).

fuel cell – apparatus for obtaining electrical energy directly from the chemical energy set free by the oxidation (without actual burning) of a fuel such as hydrogen or coke.

fuga-/, fugit-/ – fly away, last only for a short time, e.g. **fu'gacity** (fiu'gæsiti) – tendency of a substance to expand or escape. **'fugitive dyes** – dyes which readily lose their colour, e.g. in sunlight, when washed.

fugue (fjuug) – state in which a person tries to get away from real life and wanders about in a dream-like state.

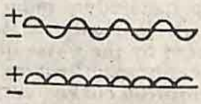
FULCRUM

'fulcrum ('fʌlkrəm) – the point on which a lever moves.

fuller's earth ('fuləz -) – clay-like material, used to absorb fat and oil from cloth, also for purifying oils.

'fulling (cloth) ('fuliŋ) – treating cloth with soap and chemicals so as to shrink (contract) it and give it a hairy surface.

full-wave 'rectification – Rectification = making from an alternating current a current which flows in only one direction. In full-wave rectification, the current impulses in both directions are changed into impulses in one direction.



FULL-WAVE RECTIFICATION

'ful'minates ('fʌlmineits) – salts of **ful'minic acid,** C:N.OH, e.g. mercury fulminate: these salts explode very easily, e.g. when struck a blow, and are used to set off other explosives. **'fulminating, 'fulminant** – exploding suddenly; (disease) – coming on very quickly and with great force.

fum-/ – smoke, vapour. **'fumarole** ('fuməroul) – a small hole in the side of a volcano from which fumes come.

fumed ('fjuumd) – (wood, e.g. oak) darkened with ammonia vapour.

'fumigant – substance burned to make smoke so as to kill insects (etc.). **fuming acid** – acid which makes a smoke-like vapour with the water-vapour in the air above it.

'function (maths.) – mathematical relationship: "*y* is a function of *x*" means *y* changes with *x*, so that for a certain value of *x*, *y* has a certain value (or values); e.g. pressure of atmosphere is a function of height above the sea = pressure depends upon, and changes with height. ↓ exponential, ↓ hyperbolic.

'function (medicine) – the ordinary work of a certain part of the body.

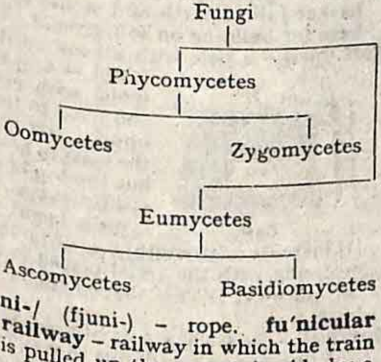
functional disorder – illness due to failure in the work of an organ, not to disease of the organ itself, e.g. bad digestion (not ↓cancer of the stomach).

'funda'mental ('fʌndə'mentəl) – at the base, on which other things are founded (built up), e.g. **fundamental units** – the units of length, mass and time on which other units are based, e.g. ↓foot-pound-second.

'fundamental 'frequency – (of a musical note): The sound-wave of a note is chiefly of one frequency (the fundamental frequency) but the note also contains waves of frequencies twice, three times . . . the fundamental frequency: ↓brilliant, ↓overtones. So also an alternating current or electric wave may be chiefly of the fundamental frequency but contain parts (components) of higher frequencies.

'fundus ('fʌndəs) – the inside of the back of the eye as seen through the front with an instrument.

'fungus ('fʌŋgəs) – non-flowering plant which has no chlorophyll (green substance by which a plant makes sugar and starch). **fungi** ('fʌŋdʒai) (plural) get their food from dead or living plant- (or animal-) material. The kinds shown in the table are described separately in their places, e.g. Phycomycetes – ↓P.

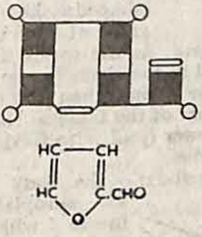


funi-/ (fjuni-) – rope. **fu'nicular railway** – railway in which the train is pulled up the mountain side by a rope.

furc-/- (fəək-) – fork, e.g. **'bifurcated** – like a fork with two points.

'furfur-/- ('fəəfə-) – like bran (the flattened woody outer covering of grain after the flour has been taken out), e.g. **'furfu'raceous**. **'furfur** – dandruff, the bran-like pieces of dried skin sometimes seen among the hair.

'furfural, 'furfu'raldehyde, 'furfu'rol – substance made from farm-waste (e.g. bran, straw, etc.) used in making certain plastics.



FURFURAL

'furlong ('fəəlɔŋ) – $\frac{1}{8}$ mile.

'furniture – all the things which are fitted on to (into) something – e.g. furniture of a door (= lock, handle, etc.); pieces of wood and metal (other than type) used in making up a page of print.

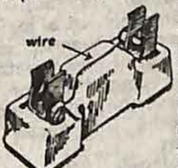
'furuncle ('fiurʌŋkl) – a small septic spot on the skin.

/-fus-/ – pour, e.g. **per'fusion** (pəə'fjuʒən) – making a drug flow through the blood-vessels of an organ.

/-fusc-/ – dull brown, e.g. **'fuscous** ('fʌskəs).

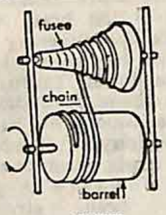
fuse (fjuz) – melt, e.g. **fused borax** = borax (a powder) melted into a solid.

fuse (electric) – a short piece of special wire which melts if more than a certain current of electricity passes through it, so breaking the circuit; used to protect electrical instruments against too great a flow of current and buildings against fire. The picture shows an old kind of fuse; in modern fuses the wire is often inside a cardboard tube.



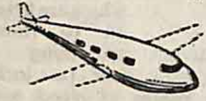
FUSE (ELECTRIC)

fuse (for explosives) – string made to burn at a regular known speed, used to cause an explosion after a certain time (so that the workers can get away to a safe distance).



FUSEE

fu'see (fju'zii) – part of an (old) clock (as in some ships). See diagram. The barrel is turned by the mainspring which is inside it. It turns the fusee (shaped as shown) and wheels by means of a chain. As the spring unwinds, the pull in the chain becomes weaker, but the chain is then pulling on a thicker part of the fusee so that the turning-power (pull × radius) is always the same.



FUSELAGE

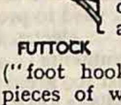
'fuselage ('fjuuzilidʒ) – the body of an aeroplane inside which the people sit and goods are put.

'fusel oil ('fjuuzəl -) – mixture of alcohols (other than the ordinary alcohol of drinks) present in alcoholic drinks (especially those newly or badly made); the fusel oils cause illness.

'fusible metal – easily melted alloys of lead, tin, bismuth, etc.; used in fire-protection instruments.

(SPINDLE) FUSIFORM

'fusiform ('fjuuzifɔɔm) – oval with pointed ends (like a spindle).



FUTTOCK

'fusion ('fjuuʒən) – (1) melting, e.g. of a metal. (2) growing together into one, e.g. of flower petals. (3) joining together to become one, e.g. of nuclei of cells, of nuclei of atoms.

'futtock ('fʌtək) – ("foot hook"): one of the curved pieces of wood joined together to make up a curved sidebeam (rib) of a ship.

G

g – acceleration (rate of increase of speed) caused by gravity, e.g. acceleration of a falling stone = 32 feet per second each second.

G – the Constant of Gravitation. The force of attraction between two Pieces of matter, P_1 and P_2 which are a certain Distance apart is proportional to:

$$\frac{\text{mass of } P_1 \times \text{mass of } P_2}{D \times D}$$

To find the force, this must be multiplied by the *Constant of Gravitation. If the masses are in grammes, and the distance is in centimetres, the force so calculated will be in ↓dynes. *$(6{\cdot}67 \times 10^{-8})$.

G – used to express the forces which, e.g., an airman has to resist when he is moving very rapidly up, down, or turning: a force of +7G = seven times the ordinary pull of gravity, that is, his weight, instead of being, e.g. 150 lbs., is 150 × 7 = 1,050 lb. Minus G is found in a rapid downward movement.

G.M. Counter – ↓Geiger Muller.

G.M.T. – ↓Greenwich Mean Time.

G.P.I. – ↓general paralysis of the insane.

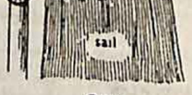
G.W. – guided weapon: ↓missile.

Ga – chemical sign for ↓gallium.

'gabar'dine ('gæbə'diin) – closely woven cotton (or wool and cotton) used for raincoats.

'gabbro ('gæbrou) – igneous (heat-formed) crystalline rock similar to granite.

'gabion ('geibiən) – basket or metal-basket full of earth and stones as a base for building on soft ground.



GAFF

gaff (gæf) – a pole with a hook on it; (ship) – a spar (pole) with one end fixed to the upper part of the mast to hold out the top of a sail longways.

gain (gein) – (1) increase in strength, e.g. of radio-receiving with the aerial placed in a certain way; (2) a V-shaped cut in a beam.

gal (gæl) – measuring unit of acceleration (increasing speed) due to gravity equal to one centimetre per second in each second. A **milligal** is 1/1000 of this and occurs (e.g.) in measuring differences of gravity in order to find oil.

ga'lact-/- (gæ'lækt-) – milk. **ga'lactic circle** – a circle round the Earth lying roughly in the middle of the ↓galaxy.

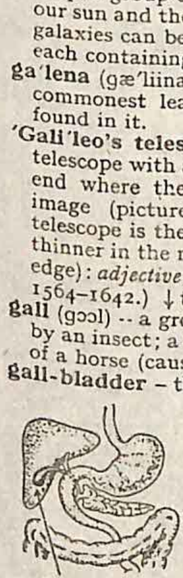
ga'lactose – a simple sugar formed from milk-sugar (lactose).

'galaxy ('gæləksi) – The faint white strip across the sky, called the Milky Way, is a galaxy; it is a flat wheel-shaped group of stars which includes our sun and the planets. Many other galaxies can be seen from the Earth, each containing millions of stars.

ga'lena (gæ'liina) – lead sulphide, the commonest lead ore; silver is also found in it.

'Gali'leo's telescope ('gæli'leiouz) – telescope with a *concave lens at the end where the eye is placed. The image (picture) seen through the telescope is the right way up: *(lens thinner in the middle than round the edge): *adjective*, **'Galil'ean.** (Italian, 1564–1642.) ↓telescope.

gall (gɔɔl) – a growth on a tree caused by an insect; a sore place on the skin of a horse (caused by rubbing).



GALL-BLADDER

gall-bladder – the container in which *bile is stored: *(green-brown liquid formed by the liver, used in the bowel in the digestion of fats).

'galley ('gæli) – (1) long flat container in which printer's type is put after setting-up in words; (2) ship's kitchen. **'galley proof** – print taken from the galley (1) for the writer to set right.

'gallic acid (gælik) – $C_6H_2(OH)_3 \cdot COOH$; acid found in tree-galls, tea and tannin: used for making skins into leather and in making black ink.

'Galli'formes ('gæli'fɔɔmiiz) – class of birds which includes ordinary poultry.

gallium ('gæliəm) – metal element, found in zinc ore; it melts at 86° F. (38° C.).

gall-stones – hard masses formed in the ↓gall-bladder when diseased.

'Galton's laws (gɔɔltənz) – An animal (etc.) inherits $\frac{1}{4}$ of the character of his body and mind from each parent, $\frac{1}{8}$ from each grandparent . . . etc.: the children of parents who are very different from the average (e.g. unusually clever) tend to be nearer the average (less unusual) than their parents.

'Galton's whistle – a whistle which gives a very high note and shows on a scale the frequency of the note made. Used in testing how high a note a person (or animal) can hear. (British, 1822–1911.)

'galvanized iron ('gælvənaizd -) – iron coated with zinc.

'galva'nometer ('gælvə'nɔmitə) – instrument for showing the presence of (or measuring small currents of) electricity.

/-gam-/ – marry, reproduce, e.g. **cryptogams** – ("hidden marriage") – the large group of plants which never produce flowers, e.g. mosses, ferns, algae.

'gamete ('gæmiit) – a male (or female) cell which, by joining with a female (male) cell, produces a cell from which an offspring may be formed.

ga'meto'cytes (gæ'miitou'saits) – cells which develop into sex cells, e.g. the gametocytes of malaria in the human blood develop into sex cells if taken into the body of a mosquito.

ga'meto'phyte (-'fait) – the form of a plant which produces ↓gametes and so reproduces sexually. ↓alternation of generations.

'gamgee tissue ('gæmdʒii -) – cotton-wool between two layers of thin, net-like cloth; used for surgical dressing.

'gamma brass ('gæmə -) – hard brass. **gamma iron** – non-magnetic iron which (with carbon or alloys dissolved in it) forms ↓austenite, a form of steel.

'gamma-rays – rays very like strong X-rays, but with shorter wave-length, sent out from certain radioactive substances at the same time as electrons (beta-rays). The rays can travel through thick metal but not through more than about two miles of air. They cause danger to life by destroying blood-forming cells inside the bones.

gam'mexane (gæ'meksein) – trade name for the gamma (3rd) possible arrangement of atoms in benzene hexachloride ($C_6H_6Cl_6$); gammexane is used to kill insects, e.g. the yellow-fever mosquito, the tsetse fly, and wireworm (in the soil).

'gamo-/- ('gæmou -) – marry, reproduce. **'gamo'tropism** – the tendency of ↓gametes to turn towards each other.

'gamo'petalous (-'petələs) – having flower petals joined together. Also called sympetalous.

'gamut ('gæmət) – range of musical notes of a certain instrument.

'ganging ('gæŋiŋ) – arranging machines or instruments so that they work together, e.g. the condensers in a radio set.

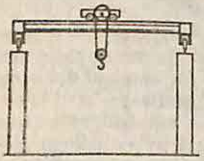
'ganglion ('gæŋgliən) – (1) group of nerve-cells; (2) soft swelling of the covering of a tendon (band of fibres which ties a muscle on to a bone).

'gangrene ('gæŋgriin) – death and decay of a part of the body, e.g. because the supply of blood to it has been stopped by wounding or cold.

'gangue ('gæŋgju) – non-metal minerals in a metal mine or in melted metal.

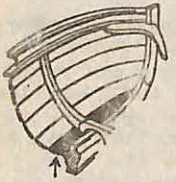
ganjah (gʌndʒə) – ↓hashish.

'gannister ('gænistə) – form of sandy rock found in middle parts of England; used to make bricks for certain kinds of steel furnaces.


GANTRY

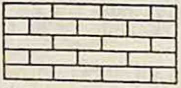
'gantry ('gæntri) – support, made of steel bars (or wood), e.g. to hold up a crane.

gapes (geips) – disease of poultry caused by a worm in the throat which causes them to die gaping (with the beak wide open).


GARBOARD

'garboard ('gaabəd) – lowest part of a ship.

garboard strake (- 'streik) – lowest long board in the bottom of a ship just above the keel.


GARDEN WALL BOND

garden wall bond – also called common bond – way of laying bricks as shown.

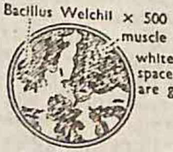
'gargle ('gaagl) – a medicine for the throat to be gargled (= held in the back of the throat while breathing outwards to bubble it).

GARGOYLE

'gargoyle ('gaagɔil) – ugly carved figure (e.g. of devil) on the outside upper part of a church, e.g. just below the roof, usually containing a pipe to carry off rain water.

'garnet ('gaanit) – a semi-precious stone, usually dark red or red-blue; hard powder of garnet crystals used for rubbing.

gas cell = ↓fuel cell.



GAS GANGRENE

'gas-'gangrene – a form of ↓gangrene in which the bacteria (*Bacillus welchii*) cause gas-formation in the wound.

GASHOLDER

'gasholder – gas store for use in a city, etc. In the commonest kind the lower container has water in it; the upper container floats up as it fills with gas. Also called **gasometer**.

'gasket ('gæskit) – soft flat piece (e.g. two thin copper sheets with ↓asbestos between) put between two metal surfaces to make a gas-tight joint, e.g. between two pipes or the top (cylinders) and bottom part (crank-case) of a motor-car engine.

'gas 'liquor (- 'likə) – water-solution of ammonia and ammonia compounds which is produced in making coal-gas.

'gas-'nipple (-'nipl) – a short piece of pipe with a screw cut on the outside: used for joining two pipes together.

'gasoline (-lene) ('gæsəliin) – petrol, motor spirit.

'gas 'scrubber – instrument for washing impurities out of coal-gas.

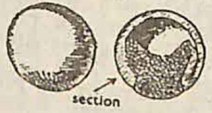
Gas'serian 'ganglion (gæ'siiriən-'gæŋgliən) – an enlargement of the fifth nerve where it goes in at the base of the brain. (Most of the fifth nerve carries sensations from the face; part of the nerve is sometimes cut in cases of ↓neuralgia of the face.)

'gastero-/, 'gastro-/, 'gastric – of the stomach. **gas'tritis** (gæs'traitis) – inflammation of the stomach.

'Gastro'poda ('gæstrou'poudə) – ("stomach-foot"): creatures (molluscs) such as snails and limpets which hold on or move about with a broad muscular outgrowth of the body.

GASTROPODA

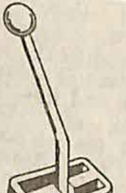
'gastrula ('gæstrulə) – the second stage in the development of young; in it the developing cells form a double-walled bag. ↓blastula.



GASTRULA

gate – part of a cinema projector (film-showing instrument) in which the film is held while light passes through it.

gate-change – When the motor-car driver changes gear he puts the gear lever into one of the openings in the gate; this opening holds it in place so that the toothed wheels of the gear keep working together.



GATE-CHANGE

gauge (geidʒ) – (1) instrument for measuring, e.g. **petrol gauge, pressure gauge** (↓Bourdon); (2) tool for measuring very small distances accurately, e.g. thickness of wire (micrometer-gauge); (3) distance apart, e.g. of lower edges of slates or tiles on a roof; (4) distance between two railway lines, e.g. **broad gauge** – 7 feet, **standard gauge** – 4 ft. 8½ ins.; **narrow gauge** – 3 ft. 6 ins.

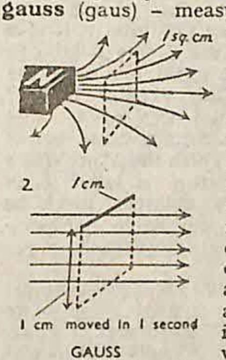
GAUGE

gauged mortar (- 'mɔɔtə) – mixture of cement (1 part), lime (1), sand (5), used in building.

gauge number – diameter of wire, thickness of metal sheet.

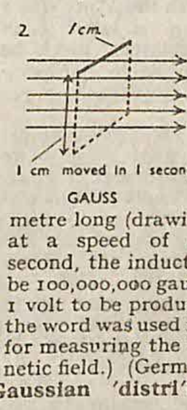
gauge pressure – pressure as shown by a gauge. This is the pressure above the pressure of the atmosphere (about 14¾ lb. per square inch); so 20 lb. per square inch gauge pressure = 34¾ lb. per square inch true pressure.

gauss (gaus) – measure of magnetic induction (= ↓flux-density), equal to 1 line of force passing through 1 square centimetre (Drawing 1). If a wire is moved in a magnetic field, e.g. across the end of a magnet, a pressure (voltage) is induced in it. If the wire is 1 centimetre long (drawing 2) and it moves at a speed of 1 centimetre per second, the induction would have to be 100,000,000 gauss for a pressure of 1 volt to be produced. (Before 1932 the word was used for ↓oersted – unit for measuring the strength of a magnetic field.) (German, 1777–1855.)



GAUSS

'Gaussian 'distri'bution – When many measures are made of a certain quantity (e.g. length) it is found that they all tend towards a certain middle value and that small differences from that middle value are more



GAUSSIAN DISTRIBUTION

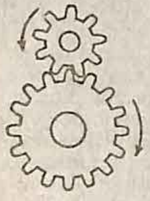
common than large differences; compare many shots of a soldier trying to hit the middle of the circle at which he is aiming. A graph which shows the number of measures of each size is bell-shaped (as shown). The Gaussian distribution is the most common distribution (spread of measures) of this kind. (German, 1777–1855.)

GAVEL

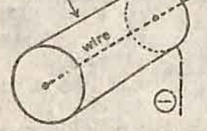
gavel (gævl) – hammer used in setting stones in place when building.

'Gay-'Lussac's Law ('gei-'luusæk) – (1) = ↓Charles' Law; (2) When gases react (combine together), the volumes of the gases (and of the substance produced if it is a gas) are simply related to each other, e.g. equal, one twice the other, etc. Thus 1 cubic foot of oxygen combines with 2 cubic feet of hydrogen to form 2 cubic feet of water vapour (which turns into water if the temperature is lower than 100° C.) The volumes must be measured at the same temperature and pressure. (French, 1778–1850.)

Ge – chemical sign for ↓germanium.


GEAR

gear (giə) – arrangement of **gear-wheels** (wheels with teeth cut in them) so that an axle may move at different speeds while the engine runs at the same speed – as in the **gear-box** of a motor-car.



GEIGER-MULLER COUNTER

'Geiger counter, Geiger-Muller counter ('gaigə) – instrument for counting radiations (e.g. from radioactive substances or ↓cosmic rays). See diagram. The wire is insulated from the tube; the wire is ⊕ 1,000 volts. A ray (cosmic or from radioactive substance) ionizes (produces electric particles in) the vapour in the tube so that a current can travel between the wire and the tube. Every passing of current works an electrical counter. (German, 1882–.)

GEISSLER TUBE

'Geissler tube ('gaislə) – a tube with small gas pressure (part vacuum) which lights up when electricity is passed through it. (German, 1814–1879.)

gel (dʒel) – jelly formed from a ↓colloidal solution, e.g. a solution of gelatin and water.

'gelatin(-e) ('dʒelətiin) – jelly made from boiled bones and skin.

'gelignite (dʒelignait) – explosive made from nitric acid, glycerine, nitrate of potash, wood-powder, cotton fibre and chalk.

'gemin-/ ('dʒemin-) – twin, two exactly alike.

'gemma ('dʒemə) – a small outgrowth which separates off from a plant (fungus, moss, etc.) and grows into a new plant.

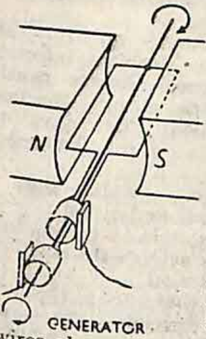
/-gen-/ (-dʒen-) – generator of, producer of, e.g. **'chromogen** – substance which produces colour.

gene (dʒiin) – a unit of heredity. A chromosome is part of the nucleus of a cell; it carries the inherited characters which make one plant or animal different from another and like the parents, grandparents, etc. The nucleus of the human sex-cell contains 23 chromosomes; the fertilized cell contains 46. A chromosome is made up of a number of genes, like a string of beads (the beads being the genes). Each gene carries one character of inheritance (e.g. brownness of eyes, wrinkledness of peas) or one unit which, joined with others, causes a certain character. See also plasmagenes.

'genera ('dʒenərə) – plural of ↓genus.

'general pa'ralysis of the in'sane – G.P.I., general decay of the brain and nervous system coming as a last result of ↓syphilis.

'generator ('dʒenəreitə) – a machine for producing electric current, e.g. as in a power station. The principle is shown in the diagram: when the coil is turned between the magnetic poles (*N*, *S*) a current of electricity flows in the coil: this current is picked up by the plates and wires shown at the bottom of the drawing.



GENERATOR

'genesis ('dʒenəsis) – the first beginning from which something came; the way in which it was developed.

ge'netics (dʒe'netiks) – the scientific study of the passing on of characters of body and mind from parents to offspring in plants and animals.

ge'nicu-/- (dʒe'nikju-) – of the knee, like a knee, e.g. **ge'niculate** – bent like a knee.

ge'nio-/- (dʒe'naiou-) – of the front part of the lower jaw, of the chin, e.g. **ge'nio'glossal muscle** – muscle of the chin and tongue.

'genit-/-o-/- ('dʒenit-o-) – having to do with reproduction. **'genitals** ('dʒenitəlz) – the sex organs, the reproductive organs.

'genotype ('dʒiinotaip) – (1) the combination (set) of heredity characters of an individual; (2) a species of a certain type as fixed by heredity. ↓ phenotype.

/-genous (-dʒənəs) – producing, produced by, e.g. **au'togenous 'vaccine** – ↓ vaccine produced from the infected material of a sick person and used to treat that disease in the same person. **en'dogenous** – produced inside. **e'xogenous** – produced outside. **ter'rigenous sediment** – substance washed off the land, deposited in the sea and formed into rocks: (*terr-* = land).

'gentian ('dʒentʃən) – plant used to give a very bitter taste to medicine.

gent saw (dʒent -) – small saw with fine teeth and straight handle used for cutting joints in wood.

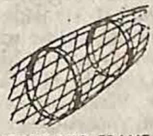
GENT SAW

'genu ('dʒenju) – knee. **'genu'valgum** (- 'vælgəm) – with the legs bent so that the knees touch. **'genu'varum** (-'veərəm) – with the legs bent outwards at the knees.

'genus ('dʒenəs) – class of animals, plants, etc., which are closely related; e.g. the genus *Felis* (cat) is divided into species (kinds of cat) – lion, tiger, leopard, and house cat.

'geo-/ – Earth, e.g. **'geo'centric system** ('dʒiiou'sentrik-) – the old idea of the sun, stars, etc., going round the Earth as their centre.

ge'odesy (dʒi'ɔdəsi) – the science of making **'geo'detic surveys** (dʒio'detik -) = making maps of large areas of the Earth allowing for (taking into calculation) the curve of the Earth. **'geo'detic 'frame** – way of arranging the bars in the frame of an aeroplane in a basket-like form so that the whole frame (not only the skin) carries the load.



GEODETIC FRAME

'geo'detic line – the shortest line between any two points on a curved surface.

'geo'graphic mile – one minute of ↓ latitude = 6076·8 feet. (U.S. – of ↓ longitude at the equator, 6087·1 feet.)

ge'ology (dʒii'ɔlədʒi) – scientific study of the Earth's outer rocks, how they are arranged and how they were formed.

geo'metric (dʒiiə'metrik) – of **geometry**, the science of measuring lines, surfaces, solids, and the relations of these measurements. **geometric ↓ isomers.**

geo'metric 'mean – number between two other numbers such that the three numbers form a ↓ geometrical progression, e.g. the geometric mean of 4 and 16 is 8. If x and y are the numbers, their geometric mean is $\sqrt{xy}$.

geo'metric 'optics (- 'optiks) – the study of the behaviour of light (e.g. how it is bent when it passes through a lens) by considering light to consist of rays. (In physical optics light is considered to consist of waves or ↓photons (= particles).)

geo'metrical pro'gression – a set of numbers each of which bears a constant ratio (fixed relation) to the one before, e.g. 2, 4, 8, 16 . . . (each is double the one before).

'geo'physics ('dʒiio'fiziks) – study of the physical nature of the Earth, e.g. of its magnetism, its conduction of electricity, of its density, of earthquakes, of oceans and the atmosphere.

'geos'trophic wind ('dʒiios'trɔfik) – wind whose direction is caused by the turning of the Earth.

'geo'syncline ('dʒiio'sinklain) – deep fold in the surface of the Earth (made by pressing inwards of its sides): this fold usually becomes filled with matter washed down from the high land on the edges of the fold; the very deep sea near the West Indies is probably an unfilled geosyncline.

'geo'taxis(-xy) (-'tæksis) – the movement of an organism or whole plant as a reaction to (action caused by) the effect of gravity.

geo'tropism (-'troupizm) – the tendency of the root of a plant to grow downwards, and the shoot (stem), etc., to grow upwards, in whatever position the plant or the seed may be put.

'geri'atrics ('dʒeri'ætriks) – the medical treatment of the old.

germ (dʒəəm) – an unscientific word used loosely for seed, nucleus of seed, bacterium, parasite in the blood, etc. **germ-/** – (1) bacteria, e.g. **germicide** – substance which kills bacteria; (2) nucleus of cell, e.g. ↓germplasm.

'Germanin ('dʒəəmənin) = Suramin, = Bayer 205, = Moranyl, = Fourneau 309 – medicine for sleeping sickness; it is lost from the body very slowly, and so is a good protection, but it does not cure the later stages of the disease as it does not enter the nervous system: (trade-names).

ger'manium (dʒəə'meiniəm) – metal element: a ↓semi-conductor, used in ↓transistors.

German measles (- miizlz) – also called Ru'bella, 'Rose'ola; infectious (but not serious) disease causing raised red marks all over the body which last about three days: the infection ends when the marks disappear.

German silver – white alloy of copper with zinc and nickel.

'germin-/- ('dʒəəmin-' – having to do with **'germin'ation** – the beginning of growth in a seed.

'germplasm – that part of the living body which develops into a new organism. (This word is found in old books when ↓chromosomes, ↓ genes, etc., were less known.)

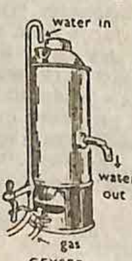
ge'ront-/ (ge'rɔnt-) – having to do with old age. **ge'ron'tology** – the scientific study of the process of growing old, of old age.

'gesso ('dʒesou) – chalk-powder and glue, or plaster of Paris (↓gypsum) put on to a surface as a base for paint.

ges'talt psy'chology (ges'tælt sai'kɔlədʒi) – study of the way in which the mind perceives (see, takes in) the outside world at any one moment, not as a number of separate things, but as one group of related things. Adding up a number of separate sensations does not give the same result as the perceiving of a whole.

ges'tation, period of (dʒes'teiʃən) – the time during which a mother carries her young inside her own body.

'gettering ('getəriŋ) – taking away the last traces of gas from inside a vacuum tube, e.g. a radio valve, by means of heated magnesium or barium.



GEYSER

'geyser – (1) – ('gaizə) – a hot-spring; a rush of hot water out of the inside of the Earth; (2) – ('giizə) – an instrument for heating water as it flows from a pipe into a bath: (the water is made to flow down over a number of hot plates or through pipes having a large heating surface).

Giant stars, Red Giant stars – The energy (light and heat) of a star is produced by the combining of hydrogen atoms into helium atoms. Red Giants are old stars which have used up 80 to 90 % of their hydrogen. If the unused hydrogen and the helium were evenly mixed together throughout the star, the star would be of normal size. But in Red Giants they are not so mixed; as a result the star becomes of abnormally great size. ↓ nova.

'gibber'ellic acid ('dʒibə'relik -) – substance obtained from a soil fungus which, when taken in by plants, causes very large (but healthy) growth, e.g. cabbages treated with gibberellic acid have grown several feet tall.

'gibbous moon ('gibəs) – moon swollen out on one side; state of moon between half and full.

gig (gig) – small light rowing boat, square (flat) at the back.

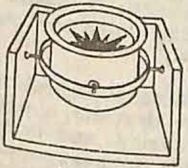
GIG

'gigant-/- ('dʒaigænt-) – giant, very big.

gigantism – disease of the ↓ pituitary gland causing a person to grow very big.

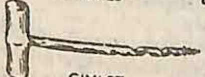
gill (gil) – breathing organ of water-creatures, e.g. of fish, shell-fish, etc. **gills** – thin sheets of tissue, hanging down from the underside of some kinds of fungus (e.g. mushroom) on which the spores are carried.

gill (dʒil) – quarter of a pint = 142 cubic centimetres.



GIMBALS

'gimbals ('gimblz) – mounting for a compass, lamp, etc. in a ship such that the compass (etc.) always stays upright although the ship moves.



GIMLET

'gimlet ('gimlit) – tool for making a hole in wood.

GIMP

gimp ('gimp) – thread with a hard centre and soft outside, e.g. silk-covered thread as used for edges of chair-covers. **gimp-pin** – small nail for fixing gimp.

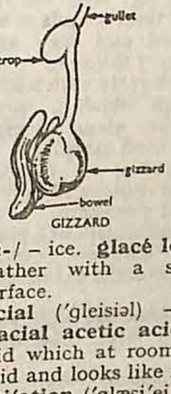
gin (dʒin) – (1) pulley wheel in a crane; (2) drum with a rope fixed to it, turned by a handle to raise, e.g., minerals out of a small mine; (3) machine for getting the seeds out of cotton.

'gingham ('giŋəm) – light cotton-cloth with coloured squares.

'gingiv-/- ('dʒindʒiv-) – having to do with the soft skin covering the bone in which the teeth are set, i.e. the gums; e.g. **'gingi'vitis** – inflammation of the gums.

give (giv) – elasticity, stretch; to stretch or begin to move when pulled.

'gizzard ('gizəd) – muscular bag in a bird's bowel in which the food is broken to powder (by means of small stones held in the gizzard).



GIZZARD

glabr-/, e.g. **'glabrous** ('gleibrəs) – – smooth, not hairy.

glac-/ – ice. **glacé leather** ('glæse) – leather with a smooth polished surface.

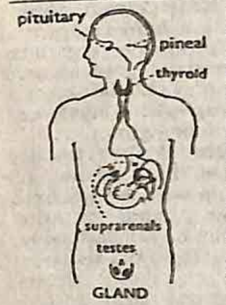
'glacial ('gleisiəl) – like ice, e.g. **glacial acetic acid** – pure acetic acid which at room temperature is solid and looks like ice.

'glaci'ation ('glæsi'eiʃən) – formation of a sheet of ice over an area, as (long ago) in the Ice Age.

'glacier ('glæsiə) – "river" of ice fed from snow in the upper part and slowly moving forward below.

'glacis ('glæsi) – sloping bank.

gland (glænd) – (1) part of the body which produces a substance necessary for the work of the body, e.g. sweat glands, milk - producing glands, ↓ lymph glands, pancreas



GLAND

(producing liquids to help in digestion). (2) **internal secretion glands** – organs which produce substances which control the work of the body at a distance from where they are produced, e.g. the thyroid gland (↓ goitre) controlling the general nutrition (feeding) of the tissues and having an effect on the other internal secretion glands. The ↓adrenal gland prepares the body against sudden danger; the pituitary controls growth, also sex development and childbirth; parathyroid controls lime and phosphorus in the bones; sex glands cause development of sex cells and sex characters, e.g. hair on face. The work of all these glands is very closely connected and they affect each other. Also ↓thymus.

gland – box filled tightly with packing material through which a moving bar passes; the gland prevents liquid or steam from escaping.

'glanders ('glaendəz) – infectious disease of horses causing sores in the nose, throat and elsewhere.

'glandular ('glaendjuulə) – of ↓glands.

'Glauber's salt ('glaubə -) – sodium sulphate, used to cause action of the bowels.

'glauc-/, e.g. **'glaucous** ('glɔɔkəs) – green, grey, or blue, like a ripe grape.

glau'coma (glɔɔ'koumə) – loss of sight caused by increased pressure of the liquids inside the eye.

'glauconite ('glɔɔkənait) – potassium iron silicate found in mud at the sea bottom. ↓green sand.

glaze (gleiz) – (1) to cover (e.g. pots) with a glass-like surface; (2) to put glass into (e.g. a window); (3) (weather) – rain which freezes on the ground.

glenoid ('gliinɔid) – shaped like the inside of a cup.

'gliadine ('glaiədiin) – a protein found in seeds, e.g. wheat, barley: it acts as a store of food for the young plant.

glide-planes – ↓slip-planes.

'glider ('glaidə) – flying machine like an aeroplane but having no engine.

gli'oma (glai'oumə) – a general word for various tumours (diseased growths) of the brain, or, more rarely, of the spinal cord.

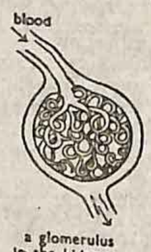
glob-/-ul-/, e.g. **'globular** ('glɔbjulə) – round like a ball. **'globule** – a small ball or round drop of liquid.

glo'biger'ina ooze (glo'bidʒə'rainə -) – deep-sea deposit consisting of the chalky remains of very small sea-creatures.

'globin ('gloubin) – ↓haemoglobin.

'globulins ('glɔbjulinz) – proteins which can be dissolved in salt solutions; they become solid with heat; e.g. fibrinogen which causes blood to become solid in a wound; there are also globulins in muscle, milk, and in plants.

glo'merulus (glɔ'merjuləs), **glo'meruli** – closely packed ball-like mass(es); small knots of blood vessels in the kidney by means of which the blood is purified.



a glomerulus in the kidney

GLOMERULUS

gloss – e.g. hard gloss paint – paint which forms a hard, smooth, glass-like surface.

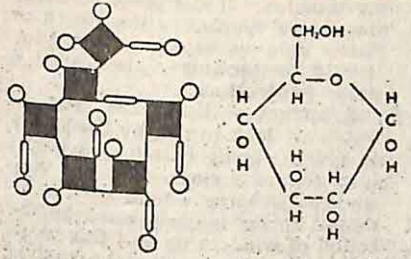
gloss-/-o- – having to do with the tongue; adj. **glossal** ('glɔsəl).

'glottis ('glɔtis) – the opening between the vocal cords (which vibrate to produce voice-sounds): it is narrow when one is singing a high note, and closes completely when one is swallowing.

gluc-/ – sweet. **'glucose** ('gluukous) – grape sugar = dextrose, a sugar found in fruit, honey, and in the blood. For formula, see next page.

'glu'cinum, glu'cinium – other names for ↓beryllium

'glucosides; (*modern name*) **glycosides** (gluu-/, 'glaikosaidz) – a group of many hundreds of different sub-

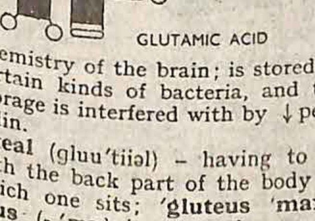


GLUCOSE

stances found in plants; they are changed by ↓enzymes into a sugar (e.g. dextrose) and a second (non-sugar) substance. This change is made (in the plant) when the substance is needed. It seems that the plant changes to a glucoside any substance which is harmful or useless (so as to get rid of it, e.g. through the bark) or which is harmful but may be needed later, or which will be used for decoration, e.g. for flower colours. Among glucosides are salicin (in the Willow), digitalin (in the Foxglove), indican (as in Indigo dye).

glume (gluum) – part of the dry outer covering of grain which comes away in threshing (separating grain-seeds from the seed-case and stem).

glu'tamic acid (gluu'tæmik) – an ↓amino-acid. It is important in the chemistry of the brain; is stored by certain kinds of bacteria, and this storage is interfered with by ↓penicillin.



GLUTAMIC ACID

glu'teal (gluu'tiiəl) – having to do with the back part of the body on which one sits; **'gluteus 'maximus** (- 'mæksiməs) – the muscle which makes that part stand out.

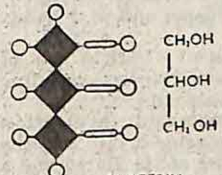
'gluten ('gluuten) – the protein part of flour (the sticky part left if the starch is washed out).

'glutinous ('gluutinəs) – sticky.

glyc-/ – sweet, e.g. **gly'caemia** (glai'siimiə) – sugar in the blood. **'hypergly'caemia** – too much sugar in the blood.

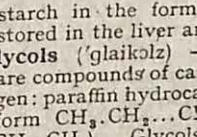
'glyceride ('glisəraid) – glycerin combined with an acid; fats are glycerides.

'glycerin, 'glycerol ('glisərin, -ɔl) – thick colourless sweet liquid often combined with other substances in medicines, e.g. for the skin, the throat, etc.; used in making explosives. It is an alcohol. It is produced as a by-product in making soap: fat + alkali → soap + glycerin.



GLYCERIN

'glycine, 'glycocoll ('glaisiin, 'glaikoukɔl) – amino-acetic acid. (Proteins are built up of ↓amino-acids. Glycine is the simplest of the amino-acids.)



GLYCINE

'glycogen ('glaikodʒen) – starch in the form in which it is stored in the liver and muscle.

glycols ('glaikɔlz) – Hydrocarbons are compounds of carbon and hydrogen: paraffin hydrocarbons are of the form $CH_3.CH_2...CH_3$ (e.g. ethane $CH_3.CH_3$). Glycols are paraffin hydrocarbons with two OH groups in place of two H atoms, e.g. **ethylene glycol**, $HO.CH_2.CH_2.OH$, used to prevent water in motor-cars from freezing.

'glycosides – ↓glucosides.

'glyco'suria (glaikɔ'sjuuriə) – sugar in the urine; it may be a sign of ↓diabetes.

/-glyph (-glif) – carve, cut, e.g. **'triglyph** ('traiglif) – block of stone with three upright grooves cut in it; also ↓anaglyph.

'glyptal resins ('gliptəl -) – colourless, sticky resins (made from glycerol and phthalic anhydride) used for sticking mica and for making certain kinds of paints and varnishes. (Trade name.)

gm – ↓ gramme.

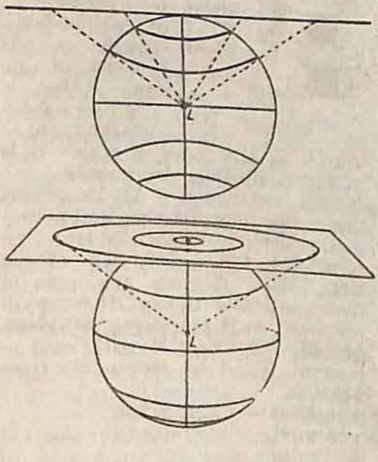
/-gnath-/ – having to do with the jaw or biting, e.g. **prog'nathous** (proug'neiθəs) – with the jaw standing forward.

gneiss (nais) – rock formed (by pressure and heat) from earlier rocks, containing light-coloured bands of ↓ quartz, ↓ feldspar and dark bands of mica.

'gnomon ('noumɔn) – upright part of a sundial showing the time by its shadow.

GNOMON

gno'monic projection – Imagine a lamp at the centre of the Earth and a flat screen touching the Earth at any point. The "shadow" of the land, lines of latitude, etc., on this screen is a gnomonic projection. In this projection the distortion (wrongness) of shape and size is great far out from the centre, but the value is that it gives true directions outwards from the centre. So it is useful for flying if the centre is at the home station, e.g. London. If the point at which the screen touches is the North or South Pole we have a **polar gnomonic projection** – also called a **polar projection.**



GNOMONIC PROJECTION

going-barrel – barrel = part of watch or clock turned by the spring or weight: going barrel = a barrel such that the clock does not stop while it is being wound up. A U-shaped spring is compressed by the action of winding up and this keeps the clock going so long as the winding up process lasts.

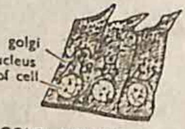
'goitre ('gɔitə) – enlargement of the ↓ thyroid gland caused, e.g., by lack of iodine in the water. **'exoph'thalmic goitre** ('eksɔf'θælmik-) – Graves' disease, von Basedow's disease – a disease of the thyroid gland which causes the eyes to stand out (*ex-* = out, *ophthalm-* = eyes), also quick heart and excitability: (picture ↓ exophthalmic).

gold-'beater's skin – very thin membrane (of animal's bowel) used e.g. in beating out gold.

golden ointment – yellow oxide of mercury in a fat, used for the eyes.

'Goldschmidt's process ('gouldʃmits -) – process for making metal oxides (e.g. ores) into metals; metal oxide is mixed with aluminium and set fire to; the aluminium is oxidized, taking the oxygen from the metal oxide.

'Golgi appa'ratus ('gɔlgai -) – a network seen near the nucleus of a body cell; it has to do with the building up of food into the cell, and the making of any secretion (substance given out by the cell).



GOLGI APPARATUS

gon-/, -gon – angle, e.g. **'pentagon** ('pentəgɔn) – figure with 5 angles.

goni'ometer ('gɔni'ɔmitə) – instrument for measuring angles, e.g. of crystals, or finding directions of radio beams.

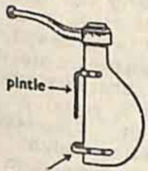
gon-/-o-/ – reproduction, birth.

'gonad ('gɔnæd) – a gland in which

male or female sex cells are produced. **'gonado'trophins** – substances produced by the front part of the ↓ pituitary gland which cause the ovaries (egg-producing organs) to send out ova (female reproductive cells).

'gono'cocci ('gɔno'kɔkai) – bacteria which cause **gonorrhoea** – an infectious disease of the sex organs.

'Gooch 'crucible, Gooch filter – a small cup with holes in the bottom covered with ↓ asbestos fibres.



GOODGEON

'goodgeon ('gʌdʒən) – (ship): ring into which a hook fits, e.g. hooks (pintles) and goodgeons by which a rudder is held on to a boat. ↓ gudgeon.

gore (gɔɔ) – 3-cornered piece of cloth put in to make part of a dress larger: one of the 3-cornered pieces of which a parachute is made.

GORE

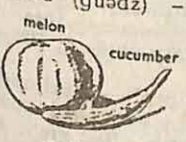
'gossan ('gɔsæn) – also called "iron hat": area at the top of a copper mine from which the copper has been washed out, leaving red-brown iron ore (limonite).

'gothic ('gɔθik) – printer's black-face type – thus Gothic.

gou'ache (gu'aaʃ) – colour-materials mixed to a thick paste with gum or glue for painting.

gouge (gaudʒ) – chisel with a curved blade.

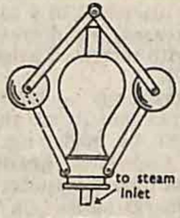
gourds (guədz) – plants such as marrow, melon, pumpkin, cucumber.



GOURD

gout (gaut) – disease in which uric acid in the blood causes small masses of solid to be formed in the joints.

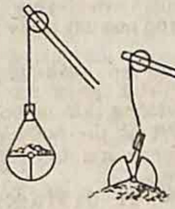
'governor ('gʌvənə) – instrument to keep the supply of steam to an engine steady, e.g. as the engine turns, the two balls (see picture) swing outwards, and if the engine goes too fast, the balls close a valve which shuts off steam.



GOVERNOR

'Graafian ('greifiən) – ↓ follicle.

'grab-crane, grab-dredger – machine for digging up earth (or raising mud from the bottom of the river). As the container is pulled up, the two halves come together drawing up earth into them: they are then pulled up, swung to one side and opened to let the earth fall out.

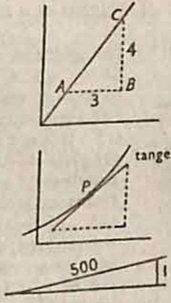


GRAB-CRANE

grade (greid) – to arrange according to quality or size, e.g. stones, fruit, etc.; one size or quality so arranged.

'graded 'profile (- 'proufiil) – the shape of the bed of an old, fully formed, river; very steeply sloped at first and becoming less and less steep as it nears the sea.

'gradient ('greidiənt) – (1) rate of change of a thing in relation to distance, e.g. the rise of a straight line. See diagram: $BC \div AB$ is the gradient of the straight line shown, $= \frac{4}{3}$ ($= 1\frac{1}{3}$). The gradient of a curve at a point P is the gradient of the ↓ tangent (touching line) drawn at P. (2) **gradient** (of a railway) – upward rise divided by distance along the rail: the gradient of the slope shown is "1 in 500"; (3) a figure showing



GRADIENT

gradual increase (decrease) of y as x is increased (decreased), e.g. decrease of air-pressure with increased height above the ground.

′graduated ′instrument – instrument with marks on it so that measurements can be made, e.g. a thermometer is graduated. **graduated glass, graduated cylinder** – container with marks on its side for measuring volumes of liquids.

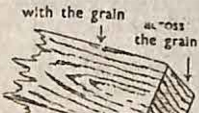
graf′fito ′pottery (græ′fiitou) – pottery covered with two layers of colour, with the top one cut away to make a design.

grafting (′graaftiŋ) – making a branch of one plant grow on to another plant; making skin or bone from another part of the body (or another person) grow in a new place to repair a wound.

′Graham's law of di′ffusion (greiəmz -) – Diffusion = spreading out of a liquid through another liquid, or gas through gas. Graham's law: – The rate of diffusion of a gas varies inversely (in the opposite way) with the $\sqrt{}$density. Example: oxygen is 16 times denser than hydrogen; it diffuses at $\frac{1}{\sqrt{16}} = \frac{1}{4}$ the speed of hydrogen.

grain (grein) – unit of weight = 0·065 gramme (about).

grain – (of wood): arrangement of fibres as in a piece of wood cut long-ways; of photographic film – fineness of particles of silver-salt; of leather – wrinkles, etc. on the skin-surface; of metal – size of crystals.



GRAIN

′graining – combing paint to make it look like wood grain.

grains, brewer's- – what is left of barley (or other grain) after beer has been made from it.

/-gram (-græm) – thing written: the written record of an instrument, e.g. ↓ cardiagram.

′grami′cidins (′græmi′saidinz) – three substances obtained from a soil-organism (*Bacillus brevis*); they kill or prevent the growth of ↓ Gram-positive bacteria, but are too poisonous to be injected into the body. The Russians used gramicidins for surface treatment of wounds.

′gramin-/ – grass, e.g. **′grami′nivorous** (′græmi′nivərəs) – grass-eating.

gramme, gram – unit of mass (weight), $\frac{1}{1000}$ of the standard ↓ kilogram. (Very nearly the mass of one cubic centimetre of water at 4° C. It was meant to be so exactly.)

gramme-atom, gramme-molecule – the quantity of a substance whose weight in grammes is equal to its ↓ atomic weight or ↓ molecular weight; e.g. atomic weight of chlorine = 35½; a gramme-atom of chlorine is the amount weighing 35½ grammes. The molecular weight of hydrogen chloride = 36½; a gramme-molecule of hydrogen chloride is the amount weighing 36½ grammes. ↓ equivalent. **′gramme-mo′lecular volume** – the volume of 1 gramme-molecule of a gas measured at standard temperature (0° C.) and standard pressure (76 centimetres of mercury in a barometer). For a ↓ perfect gas this volume is 22·4 litres.

′gramme-′calorie (-′kæləri) – the heat needed to raise 1 gramme of water from 14·5° C. to 15·5° C.

gramme-molecule – ↓ gramme-atom.

′Gram-′positive bacteria – bacteria which can be stained (dyed) with methyl violet + iodine + alcohol or acetone are Gram-positive: those which cannot be so stained but are stained red by an acid dye are Gram-negative; examples of Gram-positive (+) are the bacteria of pneumonia, anthrax, diphtheria; examples of Gram-negative are typhoid, dysentery, cholera. (Danish 1853–1938.)

grand mal (grɔn mæl) – ↓ epilepsy.

′granite (′grænit) – very hard igneous (heat-formed) rock, often grey, with coarse crystal grains. **grano-/** – of or like granite, e.g. **′grano′lithic** – made of a mixture of cement and broken granite.

'granular ('grænjulə) – covered with or made of small grains.

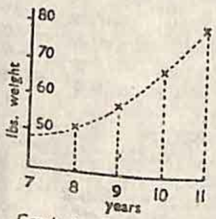
'granulate up – form a grain-like surface (in the healing of a wound when the skin has been cut away).

'granules ('grænjulz) – small grains; small particles inside a body-cell, e.g. of the substance formed by the cell for the use of the body. ↓ Golgi.

'granu'loma ('grænju'loumə) – Granular tissue is the tissue formed in the healing of wounds: a granuloma is a diseased growth formed of granular tissue, and is due to a long-standing infection, e.g. of ↓ tuberculosis or ↓ syphilis.

'grape-sugar – ↓ glucose.

graph (græf) – drawing showing the relation between two quantities, e.g. age and weight of children, time and barometer pressure.



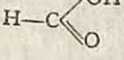
Graph showing average weight of children

GRAPH

/-graph – (1) a written or drawn thing, e.g. **photograph** ("a drawing by light"). (2) instrument which does the writing or drawing, e.g. **barograph** (instrument which records barometric pressures).

'graphical methods – ways of finding the answers in mathematics by means of drawings instead of calculation. Example: parallelogram of ↓ forces.

'graphic 'formula – way of showing chemical composition; e.g. formic acid, CH_2O_2, is shown thus:



$$H{-}C{\begin{smallmatrix}\diagup OH\\ \diagdown\!\!\diagdown O\end{smallmatrix}}$$

(The two lines show a double ↓ bond.)

'graphite ('græfait) – a form of carbon. (The black substance inside a pencil is graphite and clay.)

-graphy – (1) process or manner of making a writing or drawing, e.g. **photography**. (2) a descriptive science, e.g. **crystallography** – study of the form, structure and properties of crystals.

GRAPNEL

'grapnel ('græpnl) – anchor with four arms.

'graticule ('græti-kjuul) – glass with cross hairs in it, e.g. put into a telescope for use in map-making.

grav-/- (græv-) – heavy. **'gravid** – having young (babies) in her. **'gravid 'uterus** – organ of childbirth with a child in it.

'gravel – yellow coarse sand and small stones used for paths; small crystals of uric acid (etc.) in the urine.

Graves' disease ('greivz -) – ↓ goitre.

/-'gravida ('grævidə) – woman who is child-bearing, e.g. **'multi'gravida** – woman who has had many children.

'gravi'meter ('grævi'miitə) – instrument for detecting very small changes in the Earth's gravitation.

'gravi'metric analysis ('grævi'metrik) – separating the chemical substances which make up a mixture or compound and finding the weight of each.

'graving dock ('greiviŋ -) – container in which a ship is held in position while all the water is taken out from the container, leaving the ship dry so that the bottom of the ship can be cleaned. (Graving = cleaning the bottom of the ship.)

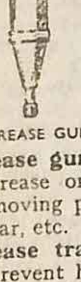
gravi'tation, **'gravity** (grævi'teiʃən, 'græviti) – the force of attraction between the Earth and some thing, e.g. the force which causes an apple to fall to the ground; the force of attraction between any two particles of matter: it depends on their masses and distance apart. ↓ G.

gravitation; 'Einstein's theory of e'quivalence ('ainstain) – ii'kwivələns) – Newton's explanation of gravity (as above) does not explain the fact that light is bent when it passes near the sun (nor certain other facts). (a) Suppose there is no gravity; a man is inside a box which is moving (upwards or downwards) with a steady speed. He feels no pressure on his feet, he has no "weight". If he sets free a stone from his hand it stays where it is in relation to him because it is moving steadily with him. If he throws the stone it goes across the box in a straight line. This state of no gravitation is Straight Line space. (b) Suppose again that there is no gravity but the box is being pulled upwards with an acceleration (steady increase of speed). His feet press against the floor of the box; a stone which is set free moves to the floor; a stone thrown sideways moves in a curved line towards the floor; a beam of light thrown across the box is curved (because the box is moving as the beam passes across). This is Curved space. These are exactly the same effects as we find in a still box when there is gravity. Einstein, in the theory of equivalence, says that the effects due to gravity are the same as those due to an acceleration of the surroundings ("box"); they are equivalent. According to Newton, gravity is a force pulling Bodies together; according to Einstein it is a natural characteristic of curved space.

'gravi'tational units (of force) – units such as the gramme, pound, which depend upon weight (= the attraction of the Earth); not ↓dyne, ↓poundal, which are the same on the Earth, Moon or anywhere.

'gravity-/-, e.g. gravity-feed, gravity-fuel system – arrangement by which, e.g., petrol, oil, etc. flows to the engine by its weight, i.e. it is not pumped in, etc.

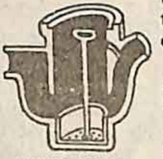
gravity, centre of – the point in anything on which it would balance.



GREASE GUN

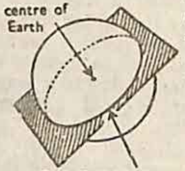
grease gun – instrument for forcing grease or very thick oil into the moving parts of an engine, motor-car, etc.

grease trap – instrument used to prevent hard grease from a kitchen from blocking the drain. The water flows out at the bottom, and up the side, leaving the grease at the top of the liquid.



GREASE TRAP

Great Circle – If a ball is cut by a knife which passes through the centre, the edge of the cut surface is a Great Circle. The shortest distance between two places over the surface of the Earth is that along the Great Circle which passes through them.



GREAT CIRCLE

green sand – grey-green sandy layers in the lower chalk strata (layers) of the Earth; the colour is due to glauconite (potassium iron silicate) which is found also in mud at the sea bottom.

'green-stick 'fracture – breaking of a bone so that part breaks and the rest only bends (usually in young bones).

GREEN-STICK FRACTURE

green 'vitriol (- 'vitriɔl) – green, crystalline iron sulphate, also called green copperas.

'Greenwich mean time ('grenidʒ) – time as measured from midday at Greenwich (England). Mean = average; the 24-hour day as on a clock is the average time in which the sun (thought of as moving) moves completely round the Earth. ↓mean sun.

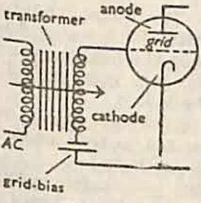
gre'garious (gre'geəriəs) – keeping together in a group (e.g. sheep), not living separately (e.g. tigers).

Gre'gorian calendar (gre'gɔɔriən -) – arrangement of days and months as now in use.

'grey 'powder – mercury and chalk used (e.g.) to stop green diarrhoea (looseness of bowels) as in babies caused by fermenting of food in the bowel.

grid – a number of parallel bars in a frame. **The Grid** – network of electric supply wires in Britain.

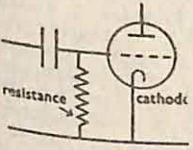
grid – (1) lines drawn on a map for describing a position; (2) (in a ↓ triode = 3-electrode radio valve). The grid is between the anode and the cathode. It consists of a spiral or network of wires. If the grid is negative it tends to prevent the passing of electrons from the cathode to the anode. In a tetrode, ↓ pentode, etc., there are further grids.



GRID-BIAS

ˈgrid-bias (-baiəs) – arrangement by which the average voltage of the grid is made slightly negative compared with the cathode. In the drawing the alternating current in the transformer makes the grid have an alternating (⊕ – ⊖) pressure; the grid-bias battery makes sure that the average voltage of the grid is negative.

grid-leak (-ˈliik) – a high resistance joined from the grid to the cathode. This prevents the grid from gradually gaining an electric charge.



GRID-LEAK

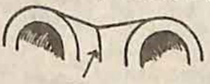
ˈGrignard reˈagents (ˈgriiniaad riˈeidʒənts) – compounds of magnesium, iodine (or bromine) with hydrogen and carbon, e.g. $C_2H_5.MgI$. They are used in synthesizing (building up) more complicated compounds such as ↓ alcohols, ↓ ethers, etc.

gripes (graips) – (1) stomach pain, e.g. in a baby; (2) canvas bands holding a ship's boat.

grippe (grip) – influenza (infectious feverish cold).

grit – sandstone with coarse angular grains.

groin (grɔin) – hollow between the top of the leg and the body (in front); curved edge where two parts of a round arched (vaulted) roof meet (as seen from inside). **groin-rib** – raised line of stone along a groin.



GROIN

ˈground effect – When an aeroplane is on the ground all its weight is on the wheels: when it is in the air the weight is spread out over a wide area of air. But when it is very near the ground it is pressing on a pad (a small area) of air between it and the ground. This causes an aeroplane which is trying to land, to float instead of sitting down; it also causes an overloaded aeroplane to go up when it has not the speed to stay up: the aeroplane rises to the height of the pad (which is as wide as the end–end width of the aeroplane's wings), then falls.

ground ray, ground wave – radio beam which goes from the sending station direct to the receiving stations without being reflected down from the upper atmosphere.

ground speed – the speed at which an aeroplane passes above the ground, e.g. 20-mile-an-hour wind against the aeroplane, speed of an aeroplane through the air 200 m.p.h., ground speed 180 m.p.h.

group (chemical) – If the chemical elements are arranged in a certain way (↓ periodic system) they form nine groups. All the elements in each group are alike (in many ways) in their chemical behaviour, e.g. Group 1 includes the elements lithium, sodium, potassium whose oxides (metal + oxygen) dissolve in water making strong alkalis.

group velocity – ↓ velocity.

ˈgrouting (ˈgrautiŋ) – filling up cracks and holes in walls by pouring in liquid cement.

growth substances – = auxins = chemical substances obtained from plants (or made in the laboratory) which (similar to human gland-substances, ↓ hormones) have special effects on the growth of plants, e.g. in causing root formation, causing fruit formation without being fertilized (and so seedless fruit). Some are used by farmers in helping the growth of grasses (e.g. corn crops) while killing non-grass family plants. ↓ gibberellic acid.

GROYNE

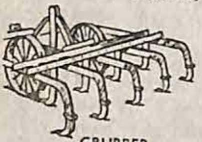
groyne (grɔin) – low wall built out to sea (or a river) to prevent the water from washing away the shore.

GRUB AXE

grub axe – tool used, e.g., for digging up big roots, or breaking up heavy soil.

'grubber – heavy machine with strong fixed teeth pulled over a field to loosen earth and pull up weeds.

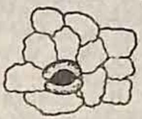
'grummet ('grʌmit) – fibre and red-lead mixed, used to make a joint between pipes.



GRUBBER

gu'ano (guu'aanou) – droppings from the bowel of birds, used as a fertilizer. It contains **guanine**, a nitrogenous compound which also forms part of some nucleic acids.

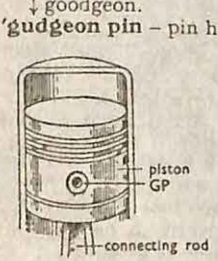
guard cells – the two cells round a stoma (small hole) in the surface of a leaf. Their shapes control the size of the opening.



GUARD CELLS

'gudgeon ('gʌdʒən) – iron pin, e.g. for joining stones; ring fixed to a gate which turns on a hook fixed to the post; ring fixed to the boat in which the hook of the rudder turns. ↓ goodgeon.

'gudgeon pin – pin holding the piston on to the connecting rod (rod moved by the piston).



GUDGEON PIN

guided weapon – ↓ missile.

'guillo'tine ('gilə'tiin) – cutter with a heavy blade used to cut the edges of books.

'guinea worm ('gini -) – a round worm about 18 inches long (up to 4 feet) which lives under the skin near the surface, e.g. of the legs or arms. The eggs are laid in water, develop inside water fleas, and enter the body of man in drinking-water.

'Guldberg and 'Wagge's Law ('guuldbəəg - 'vaagez) – law of ↓ mass action.

'gulley ('gʌli) – (1) water channel; (2) container into which water flows before it goes into the drain; (3) iron frame over the top opening of a drain, e.g. in the street.

'gum 'arabic (- 'ærəbik) – dried juice of some kinds of acacia tree, used for sticking, also in medicine.

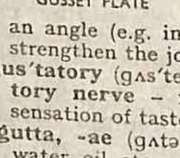
'gumma ('gʌmə) – soft spongy swelling in the skin, liver, brain or lung found in late stage of ↓ syphilis.

'guncotton ('gʌnkɔtn) – nitrocellulose, an explosive made of wood-fibre treated with nitric and sulphuric acids.

'gunmetal – blue-grey alloy of copper, tin, zinc.

'Gunter's chain ('gʌntəz -) – chain 66 feet long used for measuring land.

'gusset (gʌsit) – small 3-cornered piece of cloth sewn in to make part of a dress larger, or sewn over a join to strengthen it. **'gusset plate** – metal plate fixed over two or more beams meeting at an angle (e.g. in making a roof) to strengthen the join.



GUSSET PLATE

gus'tatory (gʌs'teitəri) – e.g. **gustatory nerve** – nerve carrying the sensation of taste.

'gutta, -ae (gʌtə, -ii-) – drop(s) of water, oil, etc.

'gutta-'percha (-'pəətʃə) – soft, rubber-like material, used, e.g., to cover electric wire.

'guy-ropes ('gai-) – ropes stretched out from the top of a post to the ground so as to hold it steady, e.g. ropes holding up a tent.

'gymbals – ↓ gimbals.

'gymno-/- ('dʒimnou-) – naked, not

GYMNOSPERM

covered, not inside a container. **'gymnosperm** – plant or tree (e.g. pine or fir tree) whose seeds are not enclosed in an ovary (seed case).

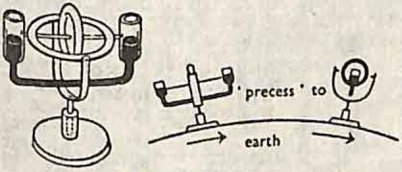
gyn-/, gynae-/- gyno-/ – female. **gynae'cologist** ('gaini'kɔlədʒist) – doctor who deals specially with diseases of women.

gy'naecium (gai'niisiəm) – the female parts of a flower, i.e. ovary (in which the seeds are formed) and the upper part (stigma) on which the pollen grains settle. Also called the pistil. For diagram, see pistil.

'gypsum ('dʒipsəm) – crystalline calcium sulphate, $CaSO_4.2H_2O$; the substance of which *plaster of Paris is made: *(quickly solidifying white plaster as used in taking casts). White gypsum rock = alabaster.

gyr-/- – spin round, e.g. **gy'rate** (dʒai'reit) – to spin round.

'gyro-'compass – compass (for ships) which points along the north–south axis (axle) of the Earth (not to the magnetic north–south). See gyroscope. The spinning wheel in the centre of the gyroscope tries to keep its axle level; the turning of the Earth from west towards the east tends to push down the west and push up the east of the gyroscope; this makes the mercury flow into the west cup; this makes the whole frame "precess" (move round) on to a north–south line.

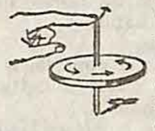


GYRO-COMPASS

'gyro ho'rizon – ↓ artificial horizon.

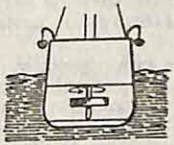
'gyroscope ('dʒairəskoup) – heavy wheel spinning in a framé. The axle of such a wheel always tends to resist any change of position. If the axle is pushed, the gyroscope does not lean in the direction of the push but "precesses" (moves in a direction at right angles to the push).

(toy) GYROSCOPE



precession in a GYROSCOPE

'gyro-'stabilizer, 'gyrostat (-steibilaizə, 'dʒairəstæt) – upright gyro wheel used to keep a ship steady.



GYRO-STABILISER

'gyrus ('dʒairəs) – ("ring"): upstanding area between sunk lines, e.g. one of the raised areas (**gyri**) on the surface of the brain.

H

H – (1) chemical sign for ↓ hydrogen; (2) ↓ horizontal component.

h – ↓ Planck's constant.

H. & D. number – ↓ Hurter and Driffield.

H.C.F. – highest common factor, the largest number by which all the numbers of a certain set can be divided, e.g. H.C.F. of 20, 30, 40 = 10.

H.E. – high explosive (explosive of great destructive power).

H.P. – ↓ horse-power.

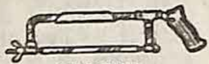
H.T. – ↓ high tension.

Haber process, 'Haber 'Bosch process ('haabə-'bɔʃ -) – way of making ammonia: nitrogen and hydrogen at over 200 times the pressure of the atmosphere are passed over a ↓ catalyst at a temperature of 500° C. The ammonia is washed out with water.

'habitat ('hæbitæt) – the place in which a plant or animal usually lives.

habit spasm – repeated sudden movement of the muscles (e.g. shutting one or both eyes and twisting up the face); not caused by disease but by an uncontrolled habit.

hachure – ↓ hatchure.



HACKSAW

'hacksaw – saw for cutting metal.

'Hadfield steel ('hædfiild) – steel with over 10% manganese in it, used where there is very heavy wear, e.g. railway line crossings.

'haem ('hiim) – the non-protein part of ↓ haemoglobin (= red substance of blood). Haem contains iron which very readily takes up oxygen and so carries oxygen from the lungs to the tissues; it is found in almost all body-cells, especially in muscle; also in yeast and in bacteria.

haem-/-a-/-t-/-o-/, haemo-/ – blood.

'haema'temesis (hiimə'temisis) – vomiting blood.

'haematite ('hiimətait) – red ironstone (Fe_2O_3), an iron ore.

'haema'toma ('hiimə'toumə) – a swelling caused by blood in the tissues due, e.g., to a blow; a bruise.

'haematopoi'esis – ↓ /-poiesis.

'haemat'osis – blood-formation.

'haemo'globin ('hiimo'gloubin) – the red substance of the blood which consists of globin (a protein) and ↓ haem. **'oxy'haemoglobin** – compound formed by the action of oxygen on haemoglobin. Oxygen is carried in this form to the tissues of the body and there given up.

hae'molysis (hii'mɔlisis) – breaking up of the red blood-cells, e.g. by chloroform, snake poison, blood of another ↓ blood-group.

'haemo'philia (-'filiə) – hereditary disease causing the blood not to solidify in a wound so that bleeding goes on.

haemopoiesis – ↓ /-poiesis.

hae'moptysis (hii'mɔptisis) – the spitting of blood.

'haemorrhage ('hemaridʒ) – bleeding.

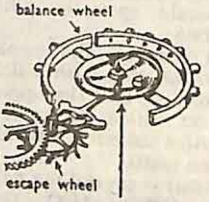
'haemorrhoid ('hemərɔid) – a swelling of a vein at the lower end of the bowel near the anus (bowel-opening), a pile.

'haemos'tatic ('hiimou'stætik) – (substance) which stops bleeding, e.g. iron perchloride, adrenalin; also called styptic.

'Haffkine's 'virus ('hæfkiin – 'vairəs) – injection used to protect against plague (disease carried by rat fleas in India, etc.).

haft (haaft) – handle of a tool, e.g. of a big hammer.

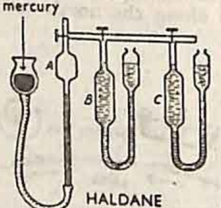
'hairspring – a fine spring which causes the balance wheel in a watch to swing first one way then the other.



HAIRSPRING

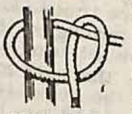
ha'lation (hə'leiʃn) – black cloud seen on a photographic film or plate (white on the print), e.g. round a window photographed from inside the building; it is caused by reflection and spreading of light inside the light-sensitive layer of the film.

'Haldane appa'ratus ('hɔɔldein -) – instrument used for finding the amount of carbon dioxide (CO_2) and of oxygen in air. Mercury flowing into *A* sends a measured amount of air into *B* (containing a substance which absorbs CO_2), then into *C* (containing a substance which absorbs oxygen).



HALDANE APPARATUS

half-hitch – half knot ("round and through").



HALF HITCH

half-life period – time in which the half of the atoms of a radioactive substance have broken up. (It is not possible to give the full life, i.e. time taken for all the substance to break up, because the break-up at each moment is a certain fraction of what is left, e.g. $\frac{1}{10}$, $\frac{1}{10}$ of $\frac{1}{10}$, $\frac{1}{10}$ of ($\frac{1}{10} \times \frac{1}{10}$) etc., and such a series has no end.)

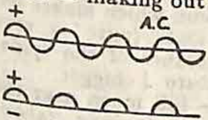
HALF-TIMBERED HOUSE

half-timbered house – wood-frame house with the spaces between the beams filled with other materials (plaster or brick).

HALF-TONE

'half-tone picture (-toun -) – picture photographed through a fine network of lines; the dark parts so become black dots and the lighter parts smaller dots; a metal plate is made from which the picture is printed.

half-wave 'rectifi'cation – Rectification = making out of an alternating current a current which flows only in one direction. In half-wave rectification the current pulses in one direction are allowed to pass; those in the other direction are stopped. (A single ↓diode valve causes half-wave rectification.)



HALF-WAVE RECTIFICATION

'halides ('heilaidz) – ↓halo-/.

'hali'tosis ('hæli'tousis) – bad-smelling breath.

Hall effect (hɔɔl -) – If an electric current flows in a conductor which is between the poles of a magnet, there is a voltage (electric pressure) difference between the edges of the conductor.

Hall process – way of getting aluminium from the mineral ore, bauxite (= aluminium hydroxide), in which it is found. The ore is dissolved in melted *cryolite: electricity is passed from a ⊕ electrode through the liquid to the container which acts as cathode (⊖ plate), and the metal collects at the bottom: *(glass-like mineral, sodium and aluminium fluoride).

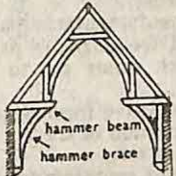
hal'luci'nation (hə'luusi-) – thinking that one sees (hears, etc.) things which are not in fact real.

'hallux ('hæləks) – big toe. **hallux valgus** (- 'vælgəs) – big toe turned in so that it is above the next toe.

Hallwach effect ('hɔɔlwɔk -) – ↓photo-electric.

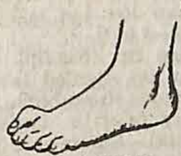
'halo ('heilou) – ring (or set of rings) sometimes seen around the sun or moon, caused by the bending of light-rays by ice crystals or small drops of water in the atmosphere.

halo-/ – salt, e.g. **'halophyte** ('heiloufait) – plant which grows in salty ground. **'halogens** ('hælodʒenz) – the chemical elements fluorine, chlorine, bromine and iodine. A salt formed by the combination of a halogen with a metal is called a **halide**; sodium chloride (common salt) is the best known example. **'haloge'nated** – combined with a halogen, e.g. **halogenated rubber** – chemical compound of rubber and bromine, fluorine or iodine; halogenation hardens the surface; bromine is used where rubber has to be stuck on to metal.



HAMMER-BEAM

'hammer-beam – beam standing out from a wall carrying a roof.

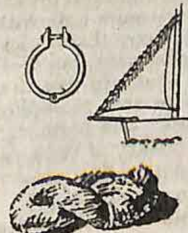


HAMMER-TOE

'hammer-toe – toe with the end bent down in its growth.

hamstrings – tendons (string-like bands) which stand out at the back of the knee.

'hangar ('hæŋə) – building in which aeroplanes are stored.



HANK

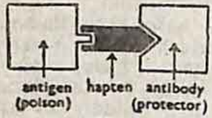
hank (hæŋk) – wool or cotton wound in a ring.

hanks – rings or hooks on the edge of a sail holding it to the stay (wire or rope holding up the mast).

hapl-/, 'haplo-/ (hæpl-) –

one, once, single, e.g. **'haploid** set of ↓chromosomes – a single set as in a sex cell instead of a double set as in a body-cell. **hap'losis** – the halving of the number of chromosomes in the production of a sex cell.

hapt-/ (hæpt-) – seize, take hold of.



HAPTEN

'hapten – An antigen is a substance which, coming into the body, causes the body to produce a protective substance (an antibody); e.g. bacterial poisons are antigens; see also allergy. The antigens are proteins. A hapten is a non-protein chemical group joined on to the antigen. The antibody is "keyed" to (specially fitted to join with) this hapten, so that the antibody attacks this one antigen and no other.

'hapteron ('hæptərɔn) – tentacle (part of creature used for seizing); part of a plant which holds on to a support.

hard valve – radio valve from which a very large proportion of the air or gas has been taken out.

hard water – water containing salts of magnesium and calcium (as from a chalky soil); soap does not easily form lather (bubbles) in it.

HARE LIP

hare lip (heə-lip) – upper lip divided into two parts (from birth).

har'monic (haa-'mɔnik) – A pure note of music consists of a certain number of air-vibrations per second. The note of a musical instrument consists of the pure note with a number of other notes (harmonics) higher than the pure note; but their frequencies are equal to the frequency of the pure note multiplied by whole numbers. The harmonics give the special quality of the note, e.g. violin (not flute). The word is used also of radio waves.

harmonic analysis – mathematical study of the harmonics (as above) in a complicated wave-form. ↓Fourier.

harmonic mean – $\frac{1}{6}$ is the harmonic mean of $\frac{1}{4}$ and $\frac{1}{8}$: (4 is the arithmetic mean (mid-point) of 2 and 6).

harmonic motion – ↓ simple harmonic motion.

'harrow ('hærou) – instrument pulled over a field to break up the large masses of soil into small pieces, or to cover seed.

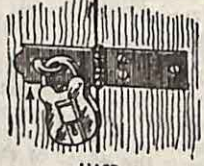
HARROW

'Harvard 'classifi'cation ('haavəd) – The light from a star can be made to form a ↓spectrum. Different stars have different kinds of spectra. The Harvard classification is the most used way of arranging the spectra into classes (or groups).

'harvest mite ('haavist-mait), **'harvester** – a very small creature found in English autumn which makes red marks on the skin: (mite = very small biting creature of the spider family): for picture ↓chigger.

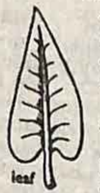
'harvest moon – full moon near the time of autumn equinox (about Sept. 22nd).

'hashish, 'hasheesh, 'haschisch (hæʃiiʃ) = *Cannabis indica* = Indian hemp = ganjah = bhang = marihuana – a drug which causes a period of excitement with loss of time-sense, followed by sleep and dreams.



HASP

hasp (haasp) – metal loop or plate with a hole in it, fixed to a door; it fits over a ring on the door-post (or the other door); a padlock is put through the ring.



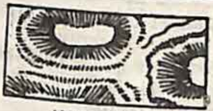
HASTATE

'hastate ('hæsteit) – spear-shaped.

hatch – covering of a **hatchway** (opening in the deck of a ship through which goods are put in or taken out); door in a roof opened by sliding off the covering.

HATCH

'hatchures



HATCHURES

('hætʃuəz) – shading on a map, showing hills, etc.

haulm (hɔɔm) – stem of plant, upper growth of potatoes above the ground.

haunch-bone ('hɔɔnʃ-) – bone which stands out on each side near the base of the front of the body, above the top of the legs.

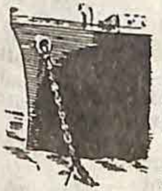
haust-/- (hɔɔst-) – suck, drink. **'haus'torium** – small growth on the stem of a parasitic fungus (or other plant); this growth goes into the plant on which the fungus is living, and by means of it the fungus gets food from the plant. **'haustus** ('hɔɔstəs) – one dose (amount) of medicine to be drunk.

Ha'versian canals (hæ'vəəsiən) – small channels (in bone) containing blood-vessels.

hawk (hɔɔk) – square board with a handle at back on which a builder carries his mortar or cement while building.

HAWK

hawse (hɔɔz) – the part of the anchor-chain between the ship and the surface of the water. **hawse-pipe** – hole in a ship through which the **hawser** (anchor chain) goes.



HAWSE

hay-fever – inflammation of the breath-passages (as in a cold), usually in autumn; caused by, e.g., vegetable dust. ↓ allergy.

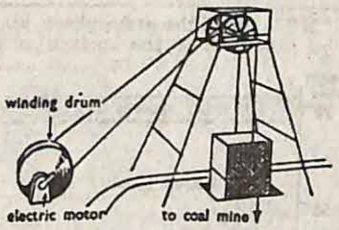
He – chemical sign for ↓ helium.

head – the force with which a stream of water comes out from a pump or pipe.

'header – brick laid with its small end outwards to the surface.

'headgear ('hedgiə) – the pulleys (and their supports, etc.) at the top of a mine, used for moving the cage (lift) up and down.

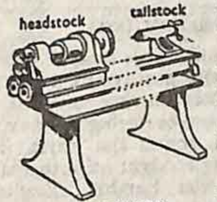
'heading ('hediŋ) – small passage made underground which will later be made larger, e.g. in making a tunnel or underground passage for a railway or in a mine.



HEADGEAR (diagrammatic)

'headphones ('hedfounz) – two telephone receivers put over the ears for listening to radio, a telephone, etc.

'headstock – support of (important) part of a machine, e.g. of the turning part of a lathe; frame inside which the cage (lift) of a mine goes up and down.



HEADSTOCK

heald (hiild) – (1) small loop through which the warp (fixed, longways threads) is put in a loom for weaving: these loops are used to lift up some of the threads to let the cross thread pass under them; (2) a bar to which several healds are fixed.

heart-lung machine – During operations on the heart, the blood can be sent through this machine where it is provided with oxygen and pumped along.

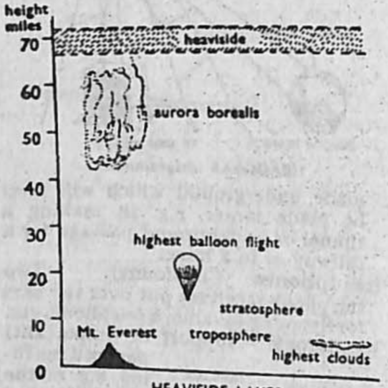
heart-wood – wood from the centre of the stem of a tree.

heat exchanger – apparatus in which heat is transferred from one material to another, e.g. from a hot gas into some steam (as in some kinds of ↓ reactor).

heat pump – any machine which takes heat from a cold Body and passes it to a warmer Body (e.g. a refrigerator which takes heat from the food to be cooled and gives it out to the surrounding air.

'Heaviside 'layer ('hevisaid 'leə) –

"E" layer of the atmosphere, about 70 miles above the surface of the Earth. The air in it is ionized (made into electrically positive or negative particles). This ionizing causes it to reflect radio waves during the day so that they go round the Earth (instead of going straight off into space away from the Earth). (English, 1850–1925.)



HEAVISIDE LAYER

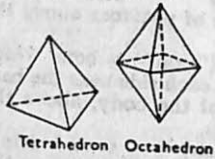
heavy hydrogen = deu'terium (dju'teriəm) – An atom of ordinary hydrogen consists of one proton (⊕ charge) in the nucleus and one electron (⊖ charge) going round. In heavy hydrogen there is also a neutron (particle with mass, but no charge) in the nucleus. **heavy water** – water consisting of heavy hydrogen + oxygen.

hebe-/ – not sharp, dull, e.g. **'hebetude** ('hebitjuud) – dullness of the mind and senses.

'hebe'phrenia ('hebi'freniə) – form of mental disorder found at an early age: there are changes from excitement to depression (loss of hope and interest) and, later, emotional dullness.

hect-o-/- – 100, e.g. **'hectograph** ('hektəgraaf) – jelly- or clay-plate used for making copies. The writing is done in ↓ aniline-dye ink on paper. The paper is pressed on to the jelly so leaving dye in the jelly. Damp paper sheets are then pressed on to the jelly; each sheet takes up a little of the dye, so making a copy.

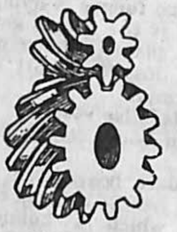
'hedon-/ – pleasure, e.g. **'hedonism** – ('hiidənizm) – idea that happiness is the main purpose of life.



/-HEDRON

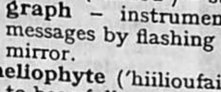
/-'hedron ('hiidrən) – /-sided solid figure, e.g. **'octa'hedron** ('ɔktə-) – 8-sided solid figure: plural, **/-hedra.**

heel over – (ship) lie over on one side.



HELICAL GEAR

'helical ('helikl) – like a ↓ helix or screw-curve. **helical gear, helical wheels** – wheels with teeth so cut that each tooth forms part of a helix. **helical spring** – ordinary "spiral" spring.



HELICOPTER

'heli'copter ('heli-'kɔptə) – flying machine held up in the air by an air-screw which turns horizontally; it can take off and land vertically.

'helio-/- ('hiiliou-) – sun, e.g. **'heliograph** – instrument for sending messages by flashing sunlight with a mirror.

'heliophyte ('hiilioufait) – plant able to bear full sunlight.

'heliostat ('hiilioustæt) – (1) instrument which moves a mirror so that it follows the sun's movements and reflects the image into a spectroscope or telescope; (2) instrument which keeps a mirror in such a position that it reflects the sun; used in map-drawing: (the position of the mirror is marked from various directions a long way off).

'helio'taxis – the reaction of an organism in response to sunlight.

'helio'tropism – ↓ tropism.

'helium ('hiiliəm) – the lightest gas (except hydrogen); about 1 in

200,000 parts of the atmosphere; used in U.S.A. for filling airships. The nucleus of the helium atom consists of two protons ⊕ and two neutrons.

'helix ('hiiliks) – a screw-curve. For drawing, ↓spiral.

'Heller's test ('heləz -) – for ↓albumen in the urine (a sign of kidney disease): the urine is poured into nitric acid and a white ring forms where the two liquids touch (caused by the albumen becoming undissolved).

Hel'minthes (hel'minθiiz) – group of parasitic worms. **'helmin'thiasis** (-θaiəsis) – illness due to worms in the body.

helve (helv) – handle of an axe or hammer.

hem-/ = ↓haem-.

'hemi-/ – half. **'hemi'plegia** ('hemi'pliidʒiə) – paralysis (loss of power of movement) on one side due to breaking of a blood-vessel in the brain.

He'miptera (he'miptərə) – family of sucking insects which includes bugs (blood sucking), aphis (plant-juice sucking), black flies (as on bean plants), green flies.

'hemisphere ('hemisfiə) – half of a sphere (ball), e.g. northern hemisphere = the northern half of the Earth, north of the equator.

hemp – fibre of which rope is made.

'henbane ('henbein) – ↓hyoscine.

bedbug (female)

bean aphis (female)

HEMIPTERA

henry – ↓inductance.

Henry's law – The amount of gas absorbed by a liquid at any temperature is directly proportional to the pressure of the gas. (American, 1797–1878.)

'heparin ('hepərin) – substance found in the liver (and other parts) which prevents solidification of the blood.

hepat-/-o-/ (he'pæt-) – liver. **he'patic** – of the liver, liver-colour (red-blue). **He'paticae** – ↓Liverworts.

hept-/-a-/ – seven, e.g. **'heptane** ('heptein) – a liquid obtained from petroleum which has a chain of 7 carbon atoms in its molecule.

'heptode ('heptoud) – a radio valve with 7 electrodes.

'heptose ('heptous) – a sugar with 7 oxygen atoms in the molecule.

her'baceous (həə'beiʃəs) – of herbs (small flowering plants whose stems die down every year). **her'barium** – ↓arium.

he'reditary (hə'reditəri) – inherited, got from one's father, mother and those before them: e.g. the colour of the eyes is a **hereditary characteristic**; but yellow hair produced by a chemical is an **acquired characteristic**. **he'redity** (he'rediti) – the passing on of characteristics of body and mind through reproduction.

her'maphrodite (həə'mæfrədait) – a creature or human which has both male and female sex organs.

'hernia ('həəniə) – pushing out of part of the bowel through a weak part of the muscle wall at the front of the body.

'heroin ('herouin) – a form of ↓morphine, a habit-forming drug; (heroin is the worst of such drugs in destroying emotional values and sense of right and wrong).

'Héroult 'furnace ('heroult 'fəənis) – electric furnace for melting steel.

'herpes ('həəpiiz) – water-filled spots (blisters), e.g. round the mouth, as after fever. **'herpes 'zoster** ('-zɔstə) – pain and yellow spots following the course of a nerve, caused by an organism related to that of chicken-pox. Herpes in a ring round the waist is called shingles.

hertz (heəts) – unit for measuring frequency of alternating electric current. One hertz = 1 flow (⊕ to ⊖ and ⊖ to ⊕) per second. **Hertzian waves** – electromagnetic waves of long wavelength, i.e. radio waves. (German, 1857–1894.)

'hessian ('hesiən) – strong cloth made from jute, used for bags and packing-cloth; also (when stiffened) for inside linings, e.g. to make a coat stiff at the neck.

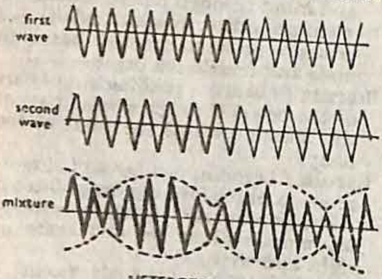
'Hess' law – The heat given out in

the making of a compound is the same whether the compound is made at once, or slowly in a series of changes; e.g. calcium chloride can be made (i) by the action of dilute (weak) hydrochloric acid on quicklime, or (ii) by dissolving the quicklime in water and then adding the acid. The heat given out in (i) is the same as the sum of the heat given out in the two steps of (ii).

'heter-/-o-/ – other, different, unequal, not all alike.

'hetero'cyclic compounds ('hetərou-'saiklik -) – compounds in which the molecule consists of a ring of carbon atoms *and other* atoms, e.g. ↓pyridine: (the benzene ring consists only of carbon atoms).

'heterodyne effect ('hetərədain -) – ("different power"). If sound waves or electric waves of different but near frequencies are received together, a combined wave is produced (see diagram). The combined effect is of lower frequency than either of the two waves of which it is made; e.g. if a radio set is receiving waves of near frequencies from two stations at once, a high whistle is produced; this is **heterodyning.**



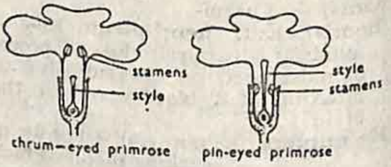
HETERODYNE

heterodyne reception – A continuous radio wave (like the first drawing above) brings no message. In heterodyne reception the receiver adds a current of near frequency so that the combined effect is a low-frequency current (as in the third drawing) which is able to make sound. In a ↓superheterodyne receiver (supersonic heterodyne receiver) the mixed current is *above* the frequency of sound (supersonic) and sound waves are obtained from it in the rest of the radio set as if it were a radio wave of very low frequency. The advantage of the superheterodyne receiver is that this lower frequency current is more easily dealt with than a higher frequency current.

'heter'oecious ('hetə'riisiəs) – ("other-house"): (fungus) which lives on one plant (e.g. wheat), then produces spores which grow on another plant (e.g. barberry); and so on alternately.

'hetero'geneous ('hetəro'dʒiiniəs) – of different kinds, not homogeneous (= all of the same kind).

'hetero'stylous (-'stailəs) – producing ↓styles of various lengths, not the same in all flowers, e.g. primrose.



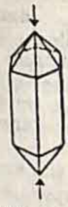
HETEROSTYLOUS

'hetero'thallic (-θælik) – Thallus = plant-body of an alga or fungus. In a heterothallic fungus there are two kinds of body threads, plus ⊕ and minus ⊖. If ⊕ and ⊖ threads touch, they form spores; but ⊕ and ⊕ or ⊖ and ⊖ do not.

'hetero'zygous (-'zaigəs) – There are certain characters of which one *or* other may be inherited from one parent, e.g. brown eyes *or* blue eyes. Heterozygous means having inherited both the different characters, e.g. brown from the mother and blue from the father. **homozygous** – having inherited the same character on both sides, e.g. brown + brown or blue + blue.

'Heusler alloy ('hɔislə) – 55% copper. 15% aluminium, 30% manganese. Although containing no iron, it can be magnetized.

hex-/-a-/ – six. **'hexagon** ('heksəgən) – figure with six angles. **he'xagonal**



HEXAGONAL

crystal system (hek'sægənəl) – crystal based on a 6-sided solid so that if it is turned about its middle line there are 6 positions (in a whole turn) such that corners, edges and faces come into the same positions. Examples, apatite, graphite, zinc.

'hexa'methylene'tetramine (-'meθiliin'tetrəmiin) = **'hexamine** – a substance made from ammonia and formaldehyde· it sets free formalin in the urine and so has an antiseptic action on the urinary organs. It is used to accelerate (speed up) the vulcanizing (sulphur treatment) of rubber; to make phenol-formaldehyde plastics (e.g. Bakelite) set hard after heat moulding and not soften again. Also called **"hexa"** in plastics works; in medicine also called **u'rotropine.**

'hexane ('heksein) – a liquid obtained from petroleum, hydrocarbon containing a chain of six carbon atoms in the molecule ↓paraffin.

'hexo'barbitone – ↓Evipan.

'hexode ('heksoud) – a radio valve with six electrodes, used in super↓heterodyne radio sets.

Hg – chemical sign for mercury (= hydrargyrum).

'hibern-/ – winter, e.g. **'hibernate** ('haibəneit) – go into a sleep-like state through the winter.

HICKS HYDROMETER

Hicks hy'drometer (- hai'drɔmitə) – tube with 3 small coloured balls in it used to see if the liquid in a car-battery is of the right density. The density of the liquid is a sign of the proportion of acid to water and may be seen by noticing which balls float, so as to know how well the battery is charged.

hi'drosis (hi'drousis) – sweating, e.g. **'hyperhi'drosis** – too much sweating.

'hidu'minium alloys ('haidju'miniəm) – alloys of aluminium + copper, magnesium, silicon, nickel, iron; also called R.R. alloys. Their tensile ("pull") strength is 3 times that of the same weight of steel. (Trade name.)

hiem-/ – winter. **'hiemal appearance** of plants ('hai.iməl -) – as they look in winter.

high-frequency current – current of more cycles (changes ⊕ to ⊖ and ⊖ to ⊕ per second than corresponds to sounds which we can hear, e.g. 15,000 cycles per second upwards. The words are used especially to describe the currents which produce, or are produced by, radio waves.

'high-tension voltage (- 'tenʃən 'voultidʒ) – a strong voltage (pressure of electricity), e.g. 650 volts or more.

'hilum ('hailəm) – mark on a seed, e.g. bean, where it was fixed on to the seed case; the same sort of mark on the kidney (or other organ) where the blood-vessels go in.

'hinny (hini) – offspring of male horse and female donkey.

hipp-/-o-/ – horse, e.g. **hip'puric acid** (hip'iuərik -) – acid found in the urine of many (especially grass-eating) animals.

hipped roof (hipt -) – roof sloping at the ends as well as the sides.

'Hiru'dinea ('hairju diniə) – leeches (creatures which hook on to the skin and suck blood).

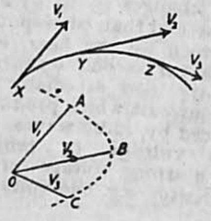
hist-/ – having to do with the tissues of the body, e.g. **his'tology** (his'tɔlədʒi) – the study of the various kinds of tissue found in the body. **'histamine** – substance (related to the ↓amino-acid **histidine**) which is set free when tissues are damaged (e.g. by a cut or blow) or irritated (e.g. by foreign proteins). It expands the small blood vessels and allows blood to escape, thus causing, e.g., swelling and red marks on the skin. **'antihista'minic** (drugs) – (drugs) which lessen or prevent these effects.

hitch – knot, e.g. ↓clove-hitch, half-hitch.

hives (haivz) – non-medical word for urticaria = nettlerash – raised spots or areas on the skin caused by food to which the sufferer is specially sensitive. ↓allergy.

hock (hɔk) – ankle-joint (between foot and leg) of an animal.

'Hodgkin's disease ('hɔdʒkinz) – enlargement of the ↓lymph glands all over the body.



HODOGRAPH

'hodograph ('hɔdograaf) – curve used for finding the acceleration (rate of gain of speed) of a Body moving along a curved path. Suppose a Body is moving along the curve *XYZ* and its velocity (speed) at the end of each second is V_1, V_2, V_3 ... as shown. Draw *OA* to represent V_1 in size and direction, *OB* to represent V_2 and *OC* to represent V_3 ... The curve *ABC* ... is the hodograph. The line *AB* represents the change of velocity while the body moves from *X* to *Y*; i.e. it tells the acceleration.

hole (semi-conductor) – ↓semi-conductor.

'holland ('hɔlənd) – coarse linen stiffened with glue (etc.) and having a very smooth surface: (e.g. window blinds).

'holo-/ ('hɔlo) – whole, complete, e.g. **'holo'crystalline rocks** – rocks wholly made up of crystals. **'holog'nathous** ('hɔlog'neiθəs) – having the jaw-bone all in one piece. **'holocene** – ↓pleistocene.

'homeo-/ (older spelling **homoeo-/**) – like, similar. **'homeo'stasis** ('houmio'steisis) – the keeping of the conditions (e.g. temperature, blood pressure) inside a living body steady. **'homeo'thermy** – the keeping of the body temperature steady (as by warm-blooded animals).

homing (of missiles) – process by which a ↓missile finds and hits the target (e.g. enemy aeroplane). **active homing** – the missile sends out and receives ↓radar pulses. **semi-active homing** – the missile receives radar pulses which are sent from the ground and reflected by the target. **passive homing** – the missile detects the heat from the target's engines.

Ho'minidae (hɔ'minidii) – the scientific group of animals (apes, etc.) which includes Man.

'homo ('houmou) – man. **'homo 'sapiens** (-'sæpienz) – ("man wise"): the present race of Man (not, e.g., ↓Neanderthal man).

homo-/ – same, e.g. ↓homosexual.

'homo'cyclic compounds ('hɔmo'saiklik -) – chemical compounds in which the molecule consists of a ring of carbon atoms only: e.g. the benzene ring. ↓heterocyclic.

homoeo-/ – ↓homeo-/.

'homoe'opathy ('houmi'ɔpəθi) – ("like-suffering"): system of medicine based on the idea that illness may be cured by small amounts of medicines which produce the same symptoms (signs, results) as those of the illness, e.g. a rash (redness of the skin) is thought to be cured by a medicine which causes a rash.

'homo'geneous ('hɔmou'dʒiiniəs) – all of one kind, e.g. a homogeneous mixture = a mixture which is the same in all parts.

ho'mologous (hɔ'mɔləgəs) – of the same nature or origin as; e.g. the fins (swimming limbs) of fish and the wings of birds are homologous. **homologous series** – group of chemical compounds whose compositions and properties (natures) are much alike, but which differ in the number of atoms (particularly $-CH_2-$ groups) from which they are made; e.g. the ↓paraffins form a homologous series: – methane CH_4, ethane $CH_3.CH_3$, propane $CH_3.CH_2.CH_3$, butane $CH_3.CH_2.CH_2.CH_3$, etc.

'homo'sexual ('houmou'seksiuəl) – having sexual feelings towards persons of the same sex.

'homo'zygous – ↓heterozygous.

hone (houn) – smooth flat stone used for sharpening tools.

'honeycomb ('hʌnikoum) – (cloth,

etc.): made up of six-sided figures. **honeycomb wall** – brick wall with regular open spaces in it.

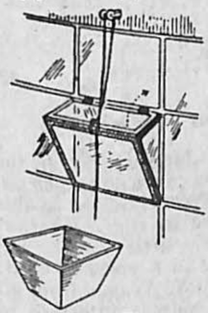
'honeydew – sweet liquid found on plants; it comes out of aphides (very small green flies seen e.g. on rose trees).

Hooke's law – In an elastic Body the change of shape is proportional to the stress (pressure or pull) within the elastic limits – meaning, e.g., if a piece of material lengthens 0·1 inch under a pull of 1 ton, it will lengthen 0·2 inches under a pull of 2 tons – unless it is pulled beyond its power of springing back.

'hook-worm – = ankylostomiasis – disease caused by worms about ½ inch long living in the bowel. They enter the body usually through the skin of the feet, especially from dirty ground on which persons empty the bowels: for picture, see ankylostomiasis.

hoop iron – thin band of iron put round boxes or barrels.

'hopper – (1) container with sides sloping in towards a hole in the bottom; (2) window which slopes inwards when it is opened so that air flows upwards into the room.



HOPPER

hori'zontal (hɔri'zɔntl) – parallel to the horizon, lying flat (not standing upright).

hori'zontal com'ponent (- kəm'pounənt) of the Earth's magnetic field. – The Earth's magnetic force makes an angle with the ground. It may be thought of as consisting of two parts: (1) a horizontal component (part) which pulls a compass needle sideways and makes it point N.–S., (2) a vertical component which pulls a magnetized needle downwards (↓ dip).

'hormone ('hɔɔmoun) – ("driver, exciter"): substance produced inside the body in a gland, and poured into the blood-stream to cause some special effect, e.g. ↓ adrenalin (hormone produced when there is sudden fear). The pituitary hormone controls growth; sex hormones produce sex characteristics, e.g. hair on face; in childbearing a hormone produced by the sex-glands causes the breast to become active.

'hornblende ('hɔɔnblend) – a mineral consisting of silicates of calcium, magnesium and iron.

horo-/ – hour. **'horo'logical** (hɔro'lɔdʒikl) – having to do with clocks.

'horripi'lation ('hɔripi'leiʃən) – hair standing up on end and rough appearance of the skin as in fear and cold.

'horsepower – the power needed to raise 550 pounds through a height of one foot in one second: = about ¾ ↓ kilowatt: (the power of a man running upstairs = about one-third H.P.).

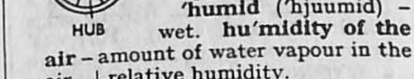
host (houst) – animal or plant on which a parasite lives.

hot (atomic energy) = radioactive.

housemaid's knee – swelling of the ↓ bursa (protective lining) under the knee-cap, due (e.g.) to much kneeling, or to a blow.

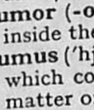
housing ('hauziŋ) – place in which a part is fixed, e.g. box into which the foot of a mast or a post fits.

Howe truss (hau)–framework of beams as shown used (e.g.) for bridges.



HOWE TRUSS

hub – central part of a wheel.



HUB

'humerus ('hjuumərəs) – upper arm-bone.

'humid ('hjuumid) – wet. **hu'midity of the air** – amount of water vapour in the air. ↓ relative humidity.

humor (-our) ('hjuumə) – liquid, e.g. inside the eye.

humus ('hjuuməs) – the part of the soil which consists of decayed vegetable matter on which plants grow.

hunter's moon – first full moon after harvest moon (= full moon near the date of the autumn equinox).

front view
HUMERUS

hunting – regular variation (i.e. more, less, more, less, etc.) of speed, direction, voltage, etc., in the working of a machine or engine due to an automatic control which over-corrects a fault.

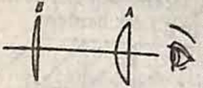
hunting tooth – extra tooth on a gear wheel, e.g. if one gear wheel has 16 teeth and the other 17, the 17th tooth is the hunting tooth.

'Hurter & 'Driffield (ˈhəətə ˈdrifiild) – A study was made of the relation between length of exposure (opening to light) and density (darkness) of a photographic film; also of density of various photographic films at the same exposure. From this study H & D numbers were calculated showing the speed of various films. This work was done about 1890 and other more accurate measures are now used.

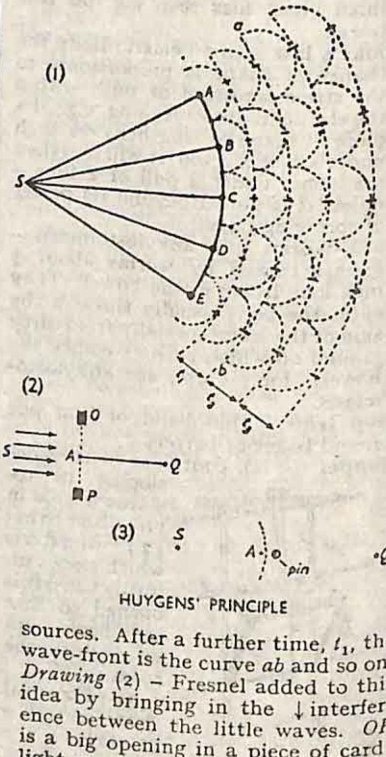
HUTCHINSON'S TEETH

'Hutchinson's teeth (ˈhʌtʃinsənz-) – V-shaped teeth with inward curved edges – a sign of hereditary ↓ syphilis.

'Huygens' 'eye-piece (ˈhɔigənz -) – eye-piece of a microscope, made from two lenses, as shown: the ↓ focal length of B is 3 times that of A, and the distance between the lenses is half their focal lengths added together. **Huygens' principle** – (The "wave-front" of a beam of light is the moving edge which travels forward). Huygens' principle is a way of knowing where a wave-front is now and calculating where a wave-front will be at some future time. *Drawing* (1) – A beam of light from S, a source of light, e.g. a lamp, has now reached AE. Any point on the front AE may be thought of as a fresh source. The imaginary waves from these sources (A, B, C, D, E) after a time, t, are shown dotted. The new wave-front is the curve which touches all these little waves. Then think of all the points on this new wave-front as sources. After a further time, t_1, the wave-front is the curve ab and so on. *Drawing* (2) – Fresnel added to this idea by bringing in the ↓ interference between the little waves. OP is a big opening in a piece of card; light comes from S. Waves from all the imaginary sources interfere in such a way that the light at a point Q is as if each source only sends light forwards and Q receives light only from A. *Drawing* (3) – If something (e.g. a pin) is put in the path of light it makes a shadow. It stops the light from little waves (e.g. A) from reaching points such as Q. Waves from other points interfere and may produce brightness at Q and ↓ **diffraction** bands (light and dark) at the edge of the shadow. (Dutch, 1629–1695.)



HUYGENS' EYE-PIECE

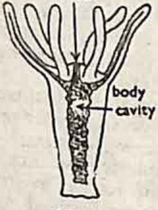


HUYGENS' PRINCIPLE

hyal-/-o-/ – clear, glass-like, e.g. **'hyaloid membrane** ('haiəlɔid) **of** the eye – clear, glass-like outer covering of the eyeball.

'hybrid ('haibrid) – offspring of parents of different races or kinds of animal or plant.

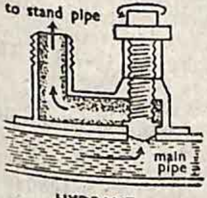
hy'datid cyst (hai'dætid -) – cyst (bag-like growth) containing larvae (young form) of parasitic worms in a muscle or organ of the body of man, sheep, horses, cows, goats: the adult (fully developed worm) is found in dogs.



HYDRA

'hydra ('haidrə) – (from a Greek word meaning a many-headed animal whose heads grew again when cut off): tube-like creature, about $\frac{1}{2}$ inch long, found in fresh water; the 6 to 8 tentacles (hair-like organs) sting living creatures and then carry them into the mouth. Hydra reproduces by growing buds, which separate off and float away, and also by the joining of male and female cells.

hydr-/ (haidr-) – having to do with water (or with liquids in general), e.g. **hydrant** – place on a water-supply pipe where water may be taken out, e.g. at a stand-pipe (for general use) or by firemen, road-cleaners, etc.



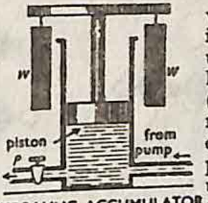
HYDRANT

hy'drargyrum (hai'dradʒairəm) – mercury.

'hydrates ('haidreits) – chemical salts which contain a certain fixed amount of water in their crystals; e.g. copper sulphate. If copper sulphate crystals (blue) are heated, the water is driven off and the crystals become an **anhydrous** powder (white).

hy'dration – the adding of water to.

hy'draulic (hai'drɔolik) – having to do with water in movement, e.g. **hy'draulic a'ccumulator** – a container in which water is stored for use in driving hydraulic (water-driven) machines. An engine-driven pump continuously pumps water into the accumulator, raising the heavy weights *W*. The water can be run out for use through the pipe *P*. In this way a small pump, working continuously, can provide much water under pressure for use a little at a time.

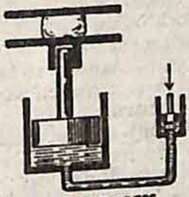


HYDRAULIC ACCUMULATOR

hydraulic cement – cement which will harden under water (not by air).

hydraulic ram – ↓ram.

hydraulic press, hydraulic brake, etc. – (press) worked by water. Small quantities of water are forced into a large container, so producing a big slow-moving force.


HYDRAULIC PRESS

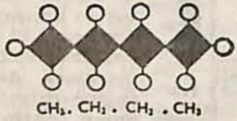
'hydrazine ('haidrəziin) – N_2H_4; colourless liquid; a very powerful *reducing substance;, it changes platinum-, gold-, silver-salts to the metals: *(taking out oxygen). **hydrazine hydrate** – hydrazine + water, has been used to drive rockets and for ↓jet propulsion.

'hydra'zoic acid ('haidrə'zouik) – HN_3: acid which with metals forms azides ($-N_3$); e.g. lead azide, $Pb(N_3)_2$, which is easily exploded and is used to detonate (set off) other explosives.

'hydride ('haidraid) – chemical compound of hydrogen and another element, e.g. sodium, calcium.

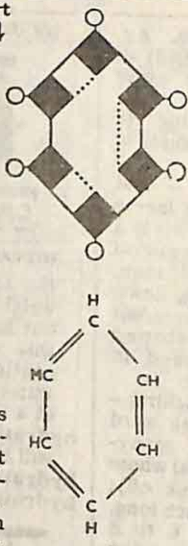
'hydrion ('haidriən) – hydrogen ion (positively charged particle of hydrogen). ↓hydrogen-ion concentration.

'hydro-/ (haidrou-) – (1) water, e.g. **'hydro-peri'cardium** – liquid in the area round (*peri-*) the heart (*card-*). (2) hydrogen, e.g. ↓ hydrocarbons.



$CH_3 . CH_2 . CH_2 . CH_3$

butare



benzene

HYDROCARBONS

'hydro'carbons – compounds of carbon and hydrogen only: (1) straight (= open) chain hydrocarbons, e.g. butane: ↓ paraffin; (2) closed chain (= ring) hydrocarbons, e.g. benzene. The ↓ terpenes (e.g. turpentine) and many sweet-smelling oils are complicated branched hydrocarbons.

'hydrocele ('haidrəsiil) – a collection of liquid round the male reproductive organ, causing swelling.

'hydro'cephalus – excess of liquid in the ventricles (hollow places) of the brain, caused by disease or injury at birth, or inherited.

'hydro'chloric acid (-'klɔrik) – also called Spirits of Salt; a solution of hydrogen chloride (HCl); it dissolves many metals (e.g. zinc) forming chlorides and setting hydrogen free.

'hydrocy'anic acid (-sai'ænik) = ↓ prussic acid = hydrogen cyanide (HCN) + water; it acts on the central nervous system and quickly causes death.

'hydrody'namics (-dai'næmiks) – scientific study of moving liquids.

'hydroe'lectric station – place at which water-power is used to generate electricity.

'hydro'fluoric acid (-'fluərik-)–hydrogen fluoride (HF) + water; it dissolves metals and attacks glass; used for etching (making lines on) glass.

'hydrofoil ('haidrofɔil) – kind of blade used to lift the hull of a boat right out of the water so that it can travel faster.

'hydrogen ('haidrədʒən) – chemical element, the lightest gas; its atom consists of one proton ⊕ and one electron ⊖. ↓ deuterium.

hydrogen bomb – bomb which obtains part of its explosive power from the fusion (joining into one) of the nuclei of light atoms (e.g. heavy hydrogen).

'hydroge'nation ('haidrodʒi'neiʃən) – adding hydrogen to a substance; e.g. oils passed with hydrogen over a nickel *catalyst gain extra hydrogen; this process is used for making motor spirit out of heavy oils, and heavy oil from coal dust; also for making vegetable oils into solid cooking fat: *(substance which causes or speeds up a chemical action without itself being changed).

'hydrogen e'lectrode – In many kinds of electric cell a zinc rod stands in a solution of zinc sulphate. The solution contains zinc ions (Zn ⊕). Similarly we may have a hydrogen electrode standing in a solution containing hydrogen ions (H ⊕). This may be made by bubbling hydrogen over a platinum plate standing in an acid solution (a solution containing hydrogen ions, e.g. HCl). A hydrogen electrode is used e.g. in measuring Redox Potential (= the tendency of a solution to gain (or lose) electrons from another solution).

hydrogen-ion concentration – An acid is a substance which sets free positive hydrogen ions, H⊕; these can join up with OH⊖ groups. Water, H⊕ OH⊖, is neither ⊕ nor ⊖; but in an acid (e.g. nitric) there is an excess of H⊕. The hydrogen-ion concentration of a substance is the amount (in grammes) of H⊕ in one litre of substance. It is usually expressed as a *p*H number. *p*H 7 means neutral (i.e. equal numbers of

$H^{\oplus}$ and $OH^{\ominus}$ ions as in water). *p*H 1 is very acid (much $H^{\oplus}$); *p*H 13 is very alkaline (a very small proportion of $H^{\oplus}$). Acid urine is about *p*H 5. Gastric (stomach) juice is *p*H 2; soil for wheat-growing is *p*H 8.

'hydrogen pe'roxide (- pə'rɔksaid) – H_2O_2; the dilute (with much water) liquid is used to take the colour out of hair, to clean teeth. The concentrated (with very little water) liquid is used to supply oxygen in engines which carry their own oxygen with them instead of getting it from the air, e.g. torpedoes, some submarines, also some German rockets.

'hydrogen 'sulphide (- 'sʌlfaid) – H_2S; poisonous gas consisting of hydrogen and sulphur, with a bad smell (like bad eggs). Also called **'sulphuretted 'hydrogen** ('sʌlfjuretid -).

hy'drography (hai'drɔgrəfi) – drawing maps of the sea-bottom for use by shipping.

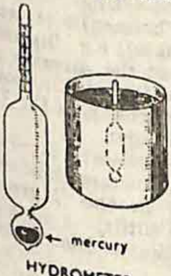
'hydrol ('haidrɔl) – molecule of water, H_2O.

'hydrolith ('haidrəli0) – calcium hydride, CaH_2: with water it makes hydrogen. Used as a means of storing and carrying hydrogen about.

hy'drolysis (hai'drɔlisis) – the breaking up of a chemical compound by water thus:

$$\begin{array}{c} A\vdots B \\ \vdots \\ + \\ \vdots \\ H\vdots OH \end{array} \rightarrow AH + BOH$$

Example: hydrolysis of ethyl acetate (↓ ester). The hydrolysis of fats is used in the making of soap: see saponification.



HYDROMETER

hy'drometer (hai'drɔmitə) – instrument used to measure the density of a liquid. If the liquid (e.g. pure milk) is dense, the stem of the hydrometer floats higher above the surface: if the milk has been watered, the hydrometer floats deeper in it. Used also in testing the acid in car-batteries, etc.

'hydrone'phrosis ('haidrone'frousis) – collection of urine in the kidney because the outlet of the urine is stopped.

'hydro'philic ('haidro'filik) – liking water, (colloid) which easily dissolves in water. **hy'drophilous** (hai'drɔfiləs) (plant) – living in water, fertilized by water-carried male celis (pollen).

'hydro'phobia ('haidro'foubiə) = rabies – disease of dogs, passed to man by a bite; it attacks the brain and spinal cord causing great excitement and contraction of the muscles, e.g. of the throat, so that trying to drink or any loud noise or bright light, etc., may cause strong contractions in all parts of the body: (*hydro-* = water, *phobia* = fear).

'hydro'phyte ('haidro'fait) – water plant.

'hydro'plane ('haidro'plein) – aeroplane which goes up from and comes down on water; high-speed boat using the pressure of the water to lift it partly out of the water.

'hydro'ponics (-'pɔniks) – the growing of plants with their roots in chemical solutions of the necessary food-materials instead of in the ground.

'hydroquin'one (-kwi'noun) – ↓ quinol.

'hydrosol ('haidrosɔl) – a colloidal (gum- or jelly-like) solution in water.

'hydrosphere ('haidrəsfiə) – the water on the Earth – seas, oceans, etc.

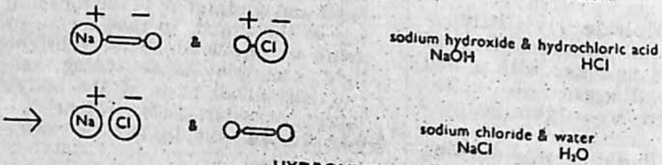
'hydrostatic level ('haidro'stætik) – two upright tubes (marked in degrees) joined by a rubber tube. The surfaces of the liquid in the tubes are always at the same level. The hydrostatic level is more accurate than a spirit-level (tube with liquid and an oil bubble) for getting an exactly level surface, and it can be used over a longer distance.

'hydro'statics – scientific study of liquids at rest (not moving).

'hydro'tropism (-'troupizm) – the turning and growth of plant roots towards water.

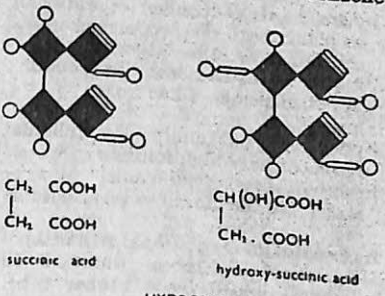
hy'droxide (hai'drɔksaid) – substance composed of a metal (usually) and a hydroxyl group (OH) or groups, e.g. sodium hydroxide, NaOH, copper hydroxide, $Cu(OH)_2$. If the hydroxide dissolves in water it makes **hydroxyl ions** and metal ions (↓ alkali). With an acid the hydroxyl ions join with hydrogen ions (or ↓ hydroxonium ions) to form water: $H + OH \rightarrow H_2O$. The metal ions and acid ions form a solution of a salt.

'hydrox'onium ('haidrɔks'ouniəm) – A hydrogen ion (positively charged particle) joins with a water molecule to form a hydroxonium ion; $H\oplus$ and $H_2O \rightarrow H_3O\oplus$.



HYDROXIDE

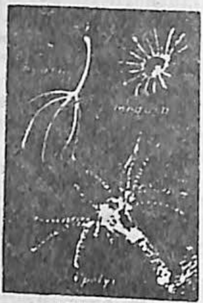
hy'droxy-/ – containing an OH group, e.g. hydroxy-benzene = benzene with an OH group in place of one of the hydrogen atoms of the molecule (commonly called phenol).



HYDROXY-/

hy'droxyl group (hai'drɔksil): the group – OH (one atom of oxygen and one atom of hydrogen) as a part of some chemical compound. ↓ hydroxide.

hydrox'ylamine (haidrɔks'ailəmiin) – hydroxy-ammonia, NH_2OH, consisting of rather explosive colourless crystals.



HYDROZOA

'hydro'zincite ('haidrə'ziŋkait –) 'zinc bloom', an ore of zinc.

'Hydro'zoa (-zouə), **'hydroids** – family of fresh-water creatures: it includes ↓ hydra, ↓ obelia, etc.; size about ¼ inch.

hygro-/ – wet. **hy'grometer** (haig'rɔmitə) – instrument for measuring the wetness of the air, e.g. by two thermometers, one enclosed in a wet cloth, the other dry: the difference in temperature shows the amount of evaporation and so the dryness of the air (↓ wet and dry bulb.) In a simple hygrometer a piece of dry catgut (skin as used to make strings of musical instruments) winds up when wet, unwinds when dry, and so moves a needle.

'hygro'scopic (substance) ('haigro'skɔpik) – which very easily takes up water, e.g. common salt is rather hygroscopic; quicklime, from which builder's lime is made, is very hygroscopic.

hylo-/ – wood, e.g. **hy'lophagous** (hai'lɔfəgəs) – wood-eating.

hymen, hymen-/ ('haimen) – (1) any membrane (thin skin), e.g. **'hyme'nology** – study of the diseases of membranes; (2) the fold of ↓ mucous membrane at the entrance of the female reproductive organ.

'hyme'nium ('haime'niiəm) – layer of reproductive cells in certain kinds of fungus, especially in the **'Hymenomy'cetes** (-mai'siitiiz) – a class of fungus which includes the mushroom.

'Hymen'optera ('haime'nɔptərə) –

the group of insects, including bees and ants, which have two pairs of transparent, membrane-like wings.

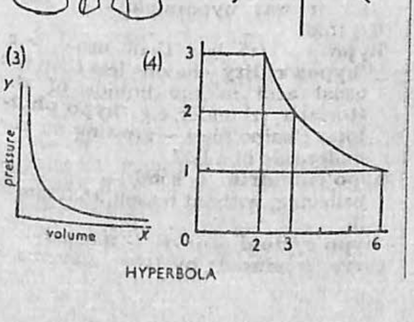
'hyoid ('hai.ɔid) – U-shaped; e.g. **hyoid bone** – the U-shaped bone at the base of the tongue.

'hyoscine ('haiəsiin) = ↓ scopolamine – drug obtained from the plant 'Hyo'scyamus (= Henbane); a drug related to atropine; it is a very powerful sleep-producing drug; is used to control great excitement, e.g. in madness; also (with morphine) for "twilight sleep" (= form of unconsciousness for child-birth).

'hypa'byssal rocks ('haipə'bisəl) – Abyssal (= plutonic) rocks are formed by solidifying of melted substance deep below the surface: hypabyssal rocks are formed from abyssal liquid forced up into cracks of solid rock above, forming walls or layers. The crystals are of various sizes.

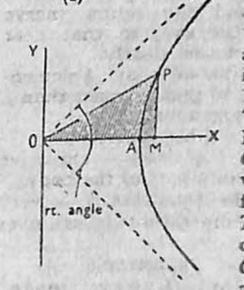
'hyper-/ ('haipə-) – over, more than usual, e.g. **'hypera'cidity** of the stomach (more than usually acid condition). **'hyper'aemia** – too much blood (in some part of the body). **'hyperaes'thetic spot** – a place on the body which is especially sensitive.

hy'perbola (hai'pəəbələ) – the curve produced if a cone is cut straight down anywhere except through the point: as in Drawing 1. Drawing 2 shows two parts of a **'hyper'bolic curve** ('haipə'bɔlic): – F_1 and F_2 are fixed points, called **foci** (plural of **focus**). P is any point on the curve: if lines are drawn from P to the two foci, the difference PF_2 minus PF_1 is always the same. Hyperbolic curves are most often found in drawing a graph showing something which becomes smaller as something else becomes larger, e.g. the greater the pressure on a gas, the smaller the volume of the gas (Boyle's Law, see Drawing 3). Here the y number (pressure) multiplied by the x number (volume) always gives the same result, as will be seen from Drawing 4. Notice that the curve does not meet the straight lines at the side and base: however great the pressure the volume never becomes 0 (zero).



HYPERBOLA

'hyper'bolic functions ('haipə'bɔlik) – Functions = relationships. (1) **Circular functions.** In Drawing (1) PA is a piece of a circle whose centre is O. The lines OP and OA are radii. The shaded area is a "function" of (is related to) the angle T; if T is doubled the area is doubled, and so on. The value of PM divided by OP is a function of T (as one changes, the other changes in a certain way). This function of T is called "sine T". So also $OM \div OP$ is a function of T called "cosine T". Because $OP = OA$, we can write these functions sine $T = PM/OA$; cos $T = OM/OA$. All these are circular functions. (2) **Hyperbolic functions.** In the second



HYPERBOLIC FUNCTIONS

drawing *PA* is part of a right-angled hyperbola. The shaded area is a function of a certain quantity u (you may think of u as being a certain unmarked angle). If u is doubled, the area is doubled, and so on. PM/OA is called the **hyperbolic sine** of u, written $\sinh u$, and OM/OA is called the **hyperbolic cosine** of u, written $\cosh u$. The letter e means the figure 2·718, and e^{-u} means $1 \div e^{u}$. From the shape of a hyperbola it can be shown that

$$\sinh u = \tfrac{1}{2}(e^{u} - e^{-u})$$

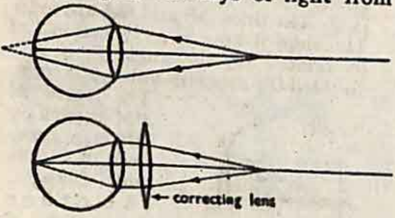
$$\text{and } \cosh u = \tfrac{1}{2}(e^{u} + e^{-u}).$$

Hyperbolic functions are used in calculations about hanging chains (catenary curves) and the sending of telegraph messages along cables. For more about e, see e.

'hypergly'caemia (-glai'kiimiə) – too much sugar in the blood. ↓ diabetes.

'hyperhi'drosis (-hi'drousis) – too much sweating.

'hyperme'tropia (-me'troupiə) – long sight; the rays of light from near things are focused (brought to a point) beyond the retina (nerve endings of the eye) so that near things are not seen clearly.



HYPERMETROPIA

'hyperon ('haipərən) – an ↓ elementary particle of greater mass than a proton (hydrogen nucleus).

'hyperpi'esia – ↓ hypertension.

'hyper'plasia (-'pleizia) – excessive growth, e.g. of a part of the body.

'hyperpy'rexia (-pai'reksiə) – very high body-temperature (fever), over 105° F.

'hyper'sonic = ↓ supersonic.

'hyper'tension, 'hyperpi'esia, 'hyperpi'esis (-pai.'iisis) – high blood-pressure.

'hyper'tonic solution (-'tɔnik -) – strong solution, stronger than some other solution, e.g. than blood, so that the liquid from the less strong solution tends to be drawn into the hypertonic solution. ↓ osmosis.

hy'pertrophy (hai'pəətrəfi) – ("over-nourish", "over-grow"): enlargement of some organ of the body, e.g. the heart owing to heavy work.

'hyperventi'lation (-venti'leiʃən) – Rapid forced breathing, as in blowing up a child's balloon, causes a loss of carbon dioxide CO_2 from the blood. The stimulus (exciting cause) of ordinary breathing is CO_2 in the blood: in hyper-ventilation too much CO_2 is breathed out, so breathing ceases till more CO_2 has been formed. This stopping of breathing may cause loss of consciousness.

'hypha ('haifə) – fibre-like part of a growing fungus, e.g. as seen growing on old bread.

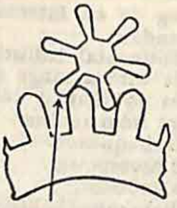
hypno-/ – sleep, e.g. **hyp'nosis** (hip'nousis) – a sleep-like state caused by looking fixedly at a bright light, or by passes with the hand and belief of the person in the powers of the **'hypnotist** (person causing hypnosis). The **'hypnotized** person believes or does whatever the hypnotist orders (unless the order given goes strongly against the hypnotized person's real nature and character). **hyp'notic** (hip'nɔtik) – (drug) which causes sleep.

'hypo (haipou) – liquid (sodium thiosulphate solution, $Na_2S_2O_3$) used in photography to "fix" a developed film by dissolving away the silver bromide not affected by light. It is called "hypo" because the old name for it was hyposulphite of soda. ↓ thio.

'hypo-/ – (1) less than usual, e.g. **'hypoa'cidity** – having less than the usual acid in the liquids of the stomach; (2) under, e.g. **'hypo'phyllous** ('haipo'filəs) – growing on the under-side of a leaf.

hypo'chondria (-'kɔndriə) – often believing, without reason, that one is ill.

'hypo'cycloid curve (-'saiklɔid-) – curve produced by the movement

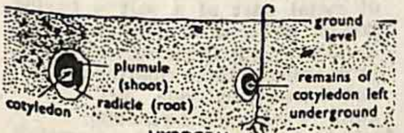


HYPOCYCLOID CURVE

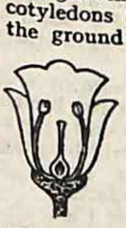
of a point on a circle rolled round *inside* a larger circle. The shape of the curve on the sides of the teeth of a watch *pinion is hypocycloid: *(smaller gear wheel turning or turned by a larger gear wheel).

'hypo'dermic injection (-'dəəmik -) – ("under skin" -): putting a drug into the body with a needle passed into the underlayer of the skin (as usually done).

'hypo'geal plant ('haipou'dʒiiəl -) – plant living underground: (of the seed-growth) – leaving the two cotyledons (first seed leaves) below the ground (not pushing them up above the ground) as does a bean.



HYPOGEAL



HYPOGYNOUS

'hypo'gynous flower (-'gainəs) – flower in which the petals and other parts are joined to the flower-stem below the ovary (seed-container), e.g. buttercup, bluebell.

hy'pophyllous – ↓ hypo-.

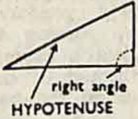
hy'pophysis (hai'pɔfisis) – part of a plant (or animal) which grows (hangs) downwards, e.g. the ↓ pituitary gland which is also called "the hypophysis". See also ↓ hypothalamus.

'hypo'plasia (-'pleiziə) – under-development, e.g. of a part of the body.

'hypo'stasis (-'steisis) – collection of blood in a part of the body owing to weak movement of the blood, e.g. **'hypo'static con'gestion** (-'stætik) – such collection of blood at the back of the lungs in a person lying down.

'hypo'style ('haipou'stail) – room with an arched roof held up by pillars.

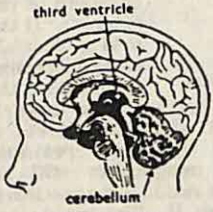
'hypo'tension – low blood pressure. **hypotensive drugs** lower blood pressure.



HYPOTENUSE

hy'potenuse (hai'pɔtənjuuz) – the side opposite the right angle in a right-angled triangle.

'hypo'thalamus ('haipou'θæləmʌs) – The third ventricle is a hollow place in the centre of the brain; the hypothalamus is its floor (the pituitary gland is part of it). The hypothalamus is the nerve-centre of simple animal-like emotional behaviour; it is in some way (not exactly known) necessary to wakefulness; damage to it produces excessive sleep.



HYPOTHALAMUS

'hypo'thermia ('haipo'θəəmiə) – "deep-freeze treatment" – way of treating illnesses by keeping the person at a temperature several degrees colder than normal body temperature.

hy'pothesis (hai'pɔθəsis) – an idea (as to the explanation of a certain event) which needs to be tested by experiment before it is known to be true.

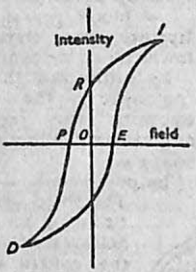
'hypo'tonic solution ('haipou'tɔnik) – a chemical solution which is less strong than another solution so that water tends to pass into the other solution. ↓ osmosis.

'hypo'trochoid – ↓ trochoid.

hypso-/ – height, e.g. **hyp'someter** (hip'sɔmitə) – instrument for finding height (by calculating it from the boiling-point of water).

hyster-/ – having to do with the uterus (female organ in which the young are formed), e.g. **'hyste'rectomy** ('histə'rektəmi) – cutting out the uterus.

'hyste'resis ('histə'riisis) – delay in returning to the first state after a change. **'hyster'esis curve** – A bar is magnetized by the magnetic field produced by passing an electric current through a coil round the bar. *I* on the curve represents the *I*ntensity (strength of the magnet). If the field is decreased by decreasing the current, the intensity (strength of the magnet) gets less; but when the current is zero there is still some **residual magnetism** (magnetism still remaining): this residual magnetism is represented by *R*. The magnetism does not become zero until an o*P*posite field of certain strength (*OP*) is applied. This second field is called the **coercive force.** A stronger opposite current magnetizes the bar in the opposite direction (shown by *D*). Decreasing the current again and then increasing it in the original direction, changes the intensity as shown *DEI*. **hysteresis loss** – Energy is wasted (as heat) in carrying out the changes in magnetization described above. The waste (loss) of energy can be worked out from the area of a hysteresis curve.



HYSTERESIS CURVE

hys'teria (his'tiiəriə) – disorder of the mind shown by unsteadiness of the emotions and (sometimes) illnesses of the body which are emotionally caused. The name is due to the fact that it was once thought that hysteria was caused by disorder in the reproductive system of women. ↓hyster-/.

I

I – chemical sign for ↓iodine.

i – sign used in mathematics for the ↓imaginary number $\sqrt{-1}$.

I.A. – International ↓angström; International agreement, e.g. Tinctura Aconiti I.A. = tincture of aconite prepared according to an internationally agreed standard.

I.C.B.M. – inter-continental ballistic missile – ↓missile with a range of about 5,000 miles so that it can reach one continent from another.

I.F. – ↓intermediate frequency.

I.H.P. – ↓indicated horsepower.

I.Q. – ↓intelligence quotient.

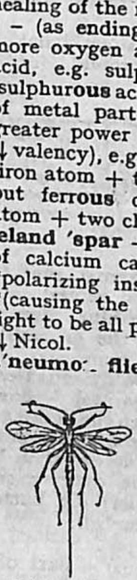
I.R.B.M. – intermediate range ballistic missile – ↓missile with a range of about 1,500 miles.

-iatr-/ – having to do with healing, e.g. **psy'chiatry** (sai'kaiətri) – the healing of the mind.

-ic – (as ending of an acid) having more oxygen atoms than a similar acid, e.g. sulphur**ic** acid, H_2SO_4; (sulphur**ous** acid, H_2SO_3). As ending of metal part of a salt – having greater power of combining (higher ↓valency), e.g. ferr**ic** chloride, $FeCl_3$ (iron atom + three chlorine atoms): but ferr**ous** chloride, $FeCl_2$ (iron atom + two chlorine atoms).

'Iceland 'spar – transparent crystals of calcium carbonate with which *polarizing instruments are made: *(causing the waves of a beam of light to be all parallel to each other). ↓Nicol.

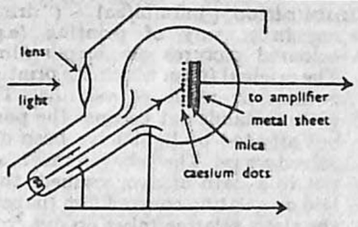
ich'neumon flies (ik'njuumɔn) – insects of the bee-ant (Hymenoptera) family which lay eggs on the bodies of other insects.


ICHNEUMON FLY

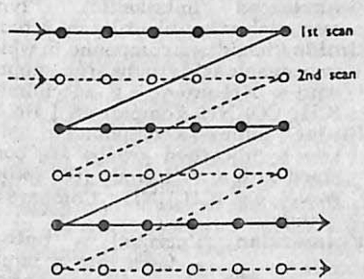
'ichor ('aikcc) – ("blood of the Gods"): the colourless liquid from a septic wound.

ichthy-/ (ikθi-) – fish, e.g. **'ichthy'osis/** – a disease in which the skin looks like the skin of a fish.

i'conoscope (ai'kɔnəskoup) – instrument which changes a picture into electric currents so that they can be sent by radio waves and picked up by a television receiver. The lens forms a light picture on a mica plate. This mica plate is covered with very small dots of caesium (a metal element). The light causes the dots to become electrically charged (⊕); the metal



Iconoscope (simplified)



scanning

ICONOSCOPE

plate behind the mica becomes negatively charged. A beam of electrons ⊖ is moved over the mica plate from side to side, as shown (= "scanning"). When the electrons ⊖ fall on a ⊕ caesium dot they take away the ⊕ charge of the dot: so a current flows in the wire joined to the back plate to take away the ⊖ charge of the back plate. Current therefore flows in this wire according to the charges on the caesium dots, i.e. according to the picture. The current is amplified (strengthened) and sent out as radio waves.

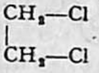
'icterus ('iktərəs) – jaundice (yellowness of the skin caused by ↓ bile in the blood and tissues). **'icterus 'gravis 'neona'torum** – ↓ Rh factor.

Id (iid) – Inborn desires are controlled and changed by teaching and experience so to make up a man's character: the Id means these desires: the character as formed is the Ego.

/-ide (-aid-) – e.g. oxide, sulphide, etc. (usually) the non-metal (⊖) element in a compound of two elements, e.g. calcium oxide CaO, sodium chloride NaCl: in organic chemistry (chemistry of carbon compounds) /-ide has no fixed or regular meaning.

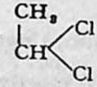
i'deal 'gas – ↓ perfect gas.

-idene (-idiin) – a chemical radical (root) of the kind C$<$. E.g. ethylene chloride is



$$\begin{array}{l} CH_2\text{—}Cl \\ | \\ CH_2\text{—}Cl \end{array}$$

but e'thy**lidene** chloride



Here the two bonds joining the Cl atoms are on the same carbon atom.

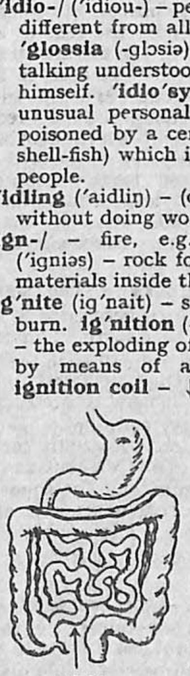
i'dentity (ai'dentiti) – (maths.): sameness, e.g. $x^2 - y^2 \equiv (x - y)(x + y)$ whatever values are given to x and y (e.g. $x = 3$, $y = 5$, etc.): the sign $\equiv$ means is identical with, is the same as.

'idio-/ ('idiou-) – peculiar to one thing, different from all others, e.g. **'idio'glossia** (-glɔsiə) – childish way of talking understood only by the child himself. **'idio'syncrasy** – peculiar, unusual personal effect, e.g. being poisoned by a certain food (such as shell-fish) which is harmless to most people.

'idling ('aidliŋ) – (of a wheel) turning without doing work.

ign-/ – fire, e.g. **'igneous rock** ('igniəs) – rock formed from melted materials inside the Earth.

ig'nite (ig'nait) – set fire to, cause to burn. **ig'nition** (-ig'niʃən) (of a car) – the exploding of the petrol and air by means of an electric spark. **ignition coil** – ↓ induction coil for making the high-voltage current for this purpose.

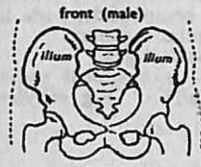


ILEUM

'ileo-/ ('ailiou-) – of the **ileum** – the lowest part of the small intestine (small bowel): it opens into the large intestine.

'ileus – loss of movement in part of the bowel, so that matter is not passed on beyond that part.

'ilium ('ailiəm) – part of the circle of bone (at the base of the body) into which the legs are fixed. When you put your hand on the bony point at top of the leg (the hip) you put it on the ilium.



ILIUM

i'llumi'nation (i'ljuumi'neiʃən) – of a surface: how brightly it is lit up. (Properly, the amount of light falling per second on a unit area, e.g. 1 square metre.) ↓foot-candle, ↓metre-candle, ↓candela.

im-/ – (1) in, e.g. ↓**'imbi'bition**; (2) not, e.g. **im'perforate** – not perforated, with no hole in it.

'image ('imidʒ) – a picture of a thing formed by a lens, mirror, etc.; e.g. the image thrown by the lens of a camera on a film, or the picture on a cinema screen, your face seen in a mirror. **'image con'verter** – instrument which changes ↓infra-red rays into green light which can be seen; used in war so as to see without being seen; used also in watching animals and birds, and in manufacturing photographic films so that workers in the factory can see in the dark.

i'maginary 'numbers – The sign $\sqrt{16}$ means 4 or -4, because $4 \times 4 = 16$ and $-4 \times -4 = 16$. To find $\sqrt{-16}$ we want a number such that, when it is multiplied by itself, the answer is -16. There is no such number in ordinary arithmetic. But in many calculations (especially concerning electricity) it is convenient to imagine such a number. The square root of any negative number is an imaginary number. The imaginary number $\sqrt{-1}$ is usually written as i or j.

i'mago (i'meigou) – the last form of an insect after it has come out of the chrysalis (hard container) stage, e.g. (1) egg; (2) larva (maggot): (3) chrysalis; (4) housefly: housefly is the imago.

'imbi'bition ('imbi'biʃən) – ("drinking in"): way of printing (e.g.) coloured pictures or cinema films. The original (from which the printing is done) is made of gelatine. The picture stands out because the parts not affected by light have been dissolved away. The gelatine sheets are put in a bath of dye, washed, then laid on gelatine-covered film (paper); the clean gelatine takes up dye from the dyed gelatine.

'imbricated ('imbrikeitid) – lying over each other like tiles on a roof.

'imide ('imaid) – a compound in which two organic acid groups are combined with a :NH group, e.g. succinimide $(CH_2.CO)_2NH$. Compare an ↓amide.

'imine ('imiin) – a compound in which two hydrocarbon groups are combined with a :NH group (the *imino-group*), e.g. $(CH_3)_2NH$. Compare an ↓amine.

i'mmersion (i'məəʃən) – putting down into a liquid, e.g. **immersion heater** – an electrically heated rod or ring put into water to heat it.

IMMERSION HEATER

i'mmiscible (i'misibl) – which cannot be mixed.

im'munity (i'mjuuniti) – (against a disease): state of being protected against a disease either by nature, or because one has already had that disease and people do not get it twice, or by injection or ↓vaccination.

im'muno'logical reaction – If strange matter (e.g. skin from another person) is introduced into or on to the body, substances (↓antibodies) are produced to oppose it (so, e.g., the skin does not grow on to the body).

'impact – hitting, e.g. of a bullet on a piece of metal. **force of impact** – force with which a thing hits. **impact strength** – toughness of a material, power of resisting a blow, e.g. of steel – high, but of glass – low. **impact test** – ↓charpy, ↓izod.

im′pacted tooth – tooth which has become fixed under part of another tooth so that it cannot grow upwards into its proper place.

IMPACTED TOOTH

im′pasto (im′pæstou) – thick colour painted on to clay before it is "fired" (heated to make it into pottery).

im′pedance (im′piidəns) – measure of the power of a coil, condenser, etc., to resist (try to stop) the flow of an alternating current. It is equal to the electric pressure (voltage) needed to drive the current *divided* by the current (amperage) which flows. The impedance of a coil, condenser, etc., changes according to the frequency of the current. ↓reactance.

im′peller (im′pelə) – that part of a pump (or blower) which drives the liquid (gas, air) away from the pump into some place where it is needed.

im′pervious (im′pəəviəs) – through which a liquid (or gas) cannot pass.

′impe′tigo = impetigo con′tagi′osa (′impe′taigou) – = Ringworm, infectious skin disease, causing first raised spots, then yellow dry scabs (dried up spots which later fall off): the word impetigo is also used of non-infectious disease of the same kind.

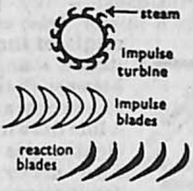
im′plicit function (im′plisit) – (function = relationship): a contained but not openly expressed relationship. A mathematical formula (statement) such as $x^2 + y^2 - 3xy = 0$ says that x and y are related to each other in a certain way, but it does not openly express y in terms of x.

′impost (′impɔst) – top of a pillar (etc.) from which an arch "springs" (on which an arch rests).

′impregnate with (′impregneit) – (e.g. wood with creosote or other liquid): cause the liquid to go right into the tissues.

′impulse (′impʌls) – a blow or push, a force acting for a short time in one direction: (measured, in mathematics, as strength of force × time for which it acts).

′impulse ′tur-bine (-′təəbain) – (**steam-turbine** = form of steam-engine in which the steam is blown through fan-wheels, or into cups fixed on the edge of wheels, so causing the wheels to turn). An impulse turbine has a number of curved blades all parallel with each other and the force comes from the steam hitting the blades. (A reaction turbine has the blades wider apart at the inlet side than at the outlet and the force comes from the ↓recoil as the steam escapes.) So also impulse water-turbine.



IMPULSE TURBINE

in-/ – (1) in, e.g. **in′cisor** – a front tooth which cuts into the food; (2) not, e.g. **in′animate** – not alive.

/-in – (1) ending (not used in a regular way) for the names of complex organic compounds which (unlike ↓alkaloids) are neutral, e.g. **digitalin, tannin.** (2) ending for the names of proteins, e.g. **myosin** – the protein of muscle, **keratin** – the protein of which hair, finger-nails, etc., are made. (3) ending for the names of substances which have particular effects on bacteria, foreign proteins, etc., e.g. **agglutinins** – ↓antibodies in the blood which cause blood cells, bacteria, etc., to agglutinate (stick together), **lysins** – substances which cause cells (e.g. bacteria) to break up, **precipitins** – substances which cause proteins from outside the body to be precipitated (thrown out of solution).

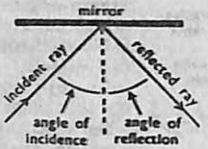
inactive gases = ↓inert gases.

′ina′nition (′inə′niʃən) – weakness due to lack of food.

′in′breeding – producing offspring from closely related animals.

′incan′descent (′inkæn′desənt) – so hot that it produces white light, e.g. the wire in an electric bulb is incandescent. **incandescent gas lamp** – gas lamp producing light by heating a "mantle" (woven tube) made of fibre treated with (chiefly) cerium and thorium salts.

'incident ray ('insidənt) – ray (of light) which hits a mirror, lens, etc. **angle of incidence** – angle between the incident ray and a line drawn at right-angles to the mirror (etc.) from the point where the ray hits.



INCIDENT RAY

in'cisor (in'saizə) – blade-shaped tooth which cuts into the food: (you have 4 above and 4 below in the front).

'incli'nation ('inkli'neiʃən) – = ↓dip of a magnetic needle.

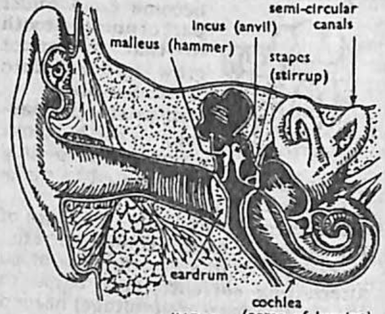
'incli'nometer – instrument for measuring slopes, e.g. of the bank at the side of a railway: of an aeroplane – instrument which shows the angle (side–side, or end–end) of an aeroplane. The simplest form is a small ball in a glass tube.

'incom'patible ('inkəm'pætibl) – (*drugs*): which cannot be used together, e.g. because they combine or break each other down into a useless or poisonous form, e.g. tannic acid + iron salts; (*blood*) which cannot be transfused into (put into the body of) a certain sick person because it is different in nature from the blood of the sick person and so causes a breaking-up of the blood cells of the sick person.

in'continence (in'kɔntinəns) – not being able to control the outflow of urine, not able to control the bowels.

incu-/ – anvil (the block of metal on which iron is hammered into shape, e.g. to make horseshoes); e.g. **incudiform** – shaped like an anvil. **'incus** ('inkəs) – bone of the ear which is shaped like an anvil.

incu'bation period (inkju'beiʃən) – time between receiving the bacteria in the body and the appearance of the disease.



INCUS

ind-/ – related to ↓indigo, e.g. **'indamines** ('indæmainz), **'ind'anthrene** (blue dyes). **'indican** – substance in plants from which indigo is made.

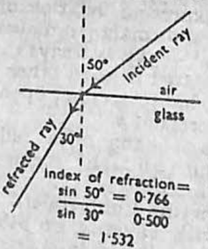
indefinite integral – ↓definite integral.

independent variable – ↓dependent variable.

'index ('indeks) – (1) number which indicates the power to which another number or quantity is raised; e.g., in x^3, 3 is the index. (2) number which shows the value of some property, etc., e.g. ↓cephalic index, ↓colour index.

'index no'tation – way of writing very large or very small numbers. Thus, $10{,}000 = 10^4$; $\frac{1}{10000} = 10^{-4}$.

index of re'fraction – a figure (ratio of ↓sines of angles) which shows the amount of bending when a ray of light passes from one transparent substance into another transparent substance, e.g. air into water: ↓Snell's law.


50°
incident ray
air
glass
30°
refracted ray
index of refraction = sin 50° / sin 30° = 0·766 / 0·500 = 1·532

INDEX OF REFRACTION

Indian hemp – ↓hashish.

'indicated horsepower – the power produced by the steam inside an engine as calculated from an ↓indicator diagram: I.H.P. is more than the Effective H.P. because power is lost (e.g.) by friction.

'indicator (chemical) – chemical substance which (e.g. by change of colour) acts as a sign of the nature of a substance; thus blue litmus becomes red when extra acid has been added.

indicator 'diagram – diagram showing the changes in pressure and volume of the steam in a steam-engine from which the work done by the steam can be calculated.

'indices ('indisiiz) – plural of ↓index.

in'digenous (in'didʒənəs) – naturally belonging to the place, not brought in from outside.

'indigo ('indigou) – a dark blue vegetable dye, once made from plants grown in India, but now made from coal-tar; the indigo plant is of the pea family.

'indium ('indiəm) – very soft metal element, softer than lead, used as a surface-coating for bearings.

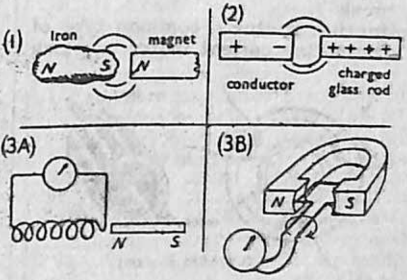
'indole – crystalline compound (C_8H_7N) found in the large intestine as a result of the break-down of ↓albumins; it is the basis of indigo.

indole-acetic acid – substance obtained from a fungus which, when taken in by plants, causes much growth; like ↓gibberellic acid in action but less effective.

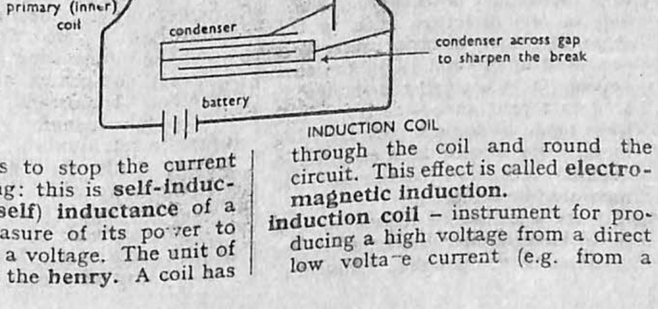
in'duce (in'djuus) – ↓induction.

in'ductance (in'dʌktəns) – When a changing current (e.g. an alternating current) flows through a coil, pressure of electricity (voltage) is induced (caused) in the coil; this pressure tries to stop the current from changing: this is **self-induction.** The (self) **inductance** of a coil is a measure of its power to produce such a voltage. The unit of inductance is the **henry.** A coil has an inductance of one henry if one volt is produced in it when the current through it changes at the rate of one ampere per second.

in'duction (in'dʌkʃən) – ("leading in"): (1) If a piece of iron touches a magnet, or if it is held near a magnet, magnetism is **induced** (put into, set up) in the iron. The poles (North, South) are as shown. (2) So also with "static" electricity as in a glass rod rubbed with a silk cloth. (3A) If a magnet is moved in relation to a coil, or (3B) if a coil is moved in relation to a magnet there is a change of magnetic field near the coil. A change of magnetic field near a coil causes a pressure (voltage) in the coil, and (if the coil is part of a closed circuit) a current flows through the coil and round the circuit. This effect is called **electro-magnetic induction.**



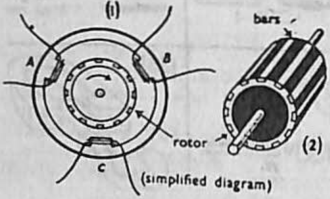
INDUCTION


ends of secondary (outside) coil
many turns of thin wire (secondary coil)
make and break
iron bar
primary (inner) coil
condenser
condenser across gap to sharpen the break
battery

INDUCTION COIL

induction coil – instrument for producing a high voltage from a direct low voltage current (e.g. from a storage battery). It works like a ↓transformer but as the current which is supplied is direct (not changing) this current is very quickly switched on and off by an instrument like an electric bell ("make and break").

induction motor – common type of alternating current motor in which no current is supplied to the rotor (part which turns). See the simplified diagram (1). One part of three-↓phase current is sent to each of the three magnetic poles, *A*, *B*, *C*. As each part of the current reaches its biggest strength in turn, the poles become magnetized in turn, that is, in the order *A*, *B*, *C*, *A*. . . . The rotor consists of metal bars joined at their ends (see diagram 2). Currents are induced (made, set up) in the bars by the changing poles and the rotor moves round trying to keep up with the poles.



INDUCTION MOTOR

in'duction stroke – the downward movement of a piston which draws in petrol vapour into the cylinder, e.g. of a motor-car engine.

in'ductive 'coupling (in'dʌktiv 'kʌpliŋ) – ↓transformer coupling.

in'ductive re'actance (- ri'æktəns) – When electricity flows through a coil first in one direction, then in the other direction, electric pressure is produced in the coil. This pressure opposes (acts against) the change; it acts as a resistance – as if the coil were made of some highly resisting metal. Resistance is measured in ↓ohms: inductive reactance is also measured in ohms.

in'ductor – a piece of apparatus used in an electric circuit because it has ↓inductance, e.g. a coil, a choke.

'indu'mentum (indju'mentəm) – covering of hair on a plant or animal, or feathers on a bird.

'indurated ('indjureitid) – hardened.

in'dusium (indj'uuziəm) – cup-shaped scale (small leaf) which protects the spores on the underside of a fern leaf.

'-ine (-iin) – (as an ending in the names of chemicals) (1) the ↓halogen elements fluorine, chlorine, bromine, iodine. (2) a hydride (compound of hydrogen with another element), e.g. **phosphine** – phosphorus hydride, PH_3; **arsine** – arsenic hydride, AsH_3. (3) a hydrocarbon in which there is a treble join between carbon atoms, e.g. ethane, $H_3C.CH_3$; ethene (= ethylene), $H_2C:CH_2$; ethine (= acetylene), $HC \vdots CH$. (4) an ↓amine (e.g. **aniline**), an amino-acid (e.g. **glycine**), and alkaloid (e.g. **quinine**) or other basic ("alkaline") organic compound.

i'nert (i'nəət) – not acting chemically with other substances. **inert gases** – a group of gases (including helium, neon, argon) which form no chemical compounds.

i'nertia (i'nəəʃiə) – A still (not moving) Body stays still unless a force acts on it; a moving Body continues to move at the same speed and in the same direction unless a force acts on it. The Body has the power to stay as it is = "the Body possesses inertia". A force must be used to change its motion and so overcome its inertia. In kicking a ball the (moving) inertia of the foot overcomes the (standing still) inertia of the ball.

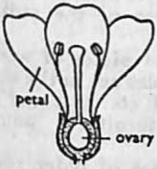
in'ertial navigation (in'əəʃəl -) – way of working out one's position from a knowledge of one's previous position and the information given by (gyroscopic) compasses and ↓accelerometers. Important, e.g., in long-range submarines.

infantile paralysis – ↓poliomyelitis.

'infarct ('infaakt) – part of an organ of the body which is dying because its blood supply has been cut off, e.g. by the blocking of an artery.

in'feri'ority 'complex – a feeling of not being as strong (clever, loved, admired, etc.) as other people which leads to various strange or unpleasant forms of behaviour, e.g. telling untrue stories, stealing, quarrelling, etc.

inferior ovary – ovary (seed container) set in the flower-stem in such a way that it is below the petals, etc.



INFERIOR OVARY

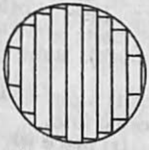
in'ferior planet – planet nearer the sun than the Earth.

'infes'tation ('infes'teiʃən) – e.g. of the hair, clothes, bowels – being filled with lice, nits, worms, or other creatures (not bacteria) which attack the body.

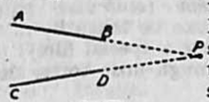
'infinite – very large, large beyond measure.

'infinite 'series ('infinit 'siiəriiz) – Example: the water in a container is 1 foot deep: half of the water left in it flows away every day; i.e. first day, $\frac{1}{2}$ foot, second day, $\frac{1}{2}$ of $\frac{1}{2}$ foot $= \frac{1}{4}$ foot, third day, $\frac{1}{2}$ of $\frac{1}{4}$ foot $= \frac{1}{8}$ foot, and so on. The amount of water which flows out is: $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots$ foot. If you go up to a million days (or any number), the total will never add up to 1, but, as the number of days increases without limit, the amount run out gets nearer to 1. An infinite series of numbers is one which never comes to an end. The sum of the infinite series (1 in our example) is the number to which the series gets nearer and nearer, as more and more of the numbers in the series are taken, but some series have no definite sum.

'infini'tesimal ('infini'tesiməl) – very small, as small as we choose; a number or quantity which we can make as small as we choose, e.g. we can think of a circle as made of a large number of infinitesimal strips. We can make the strips as narrow as we like. The narrower we make the strips, the nearer does their area come to the area of the circle.


INFINITESIMAL

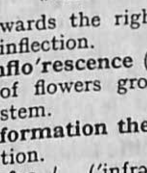
in'finity (in'finiti) – (sometimes written ∞) – Example: The smaller we make the volume of some gas the greater its pressure becomes. There is no limit to the pressure. So this fact can be written "As volume gets nearer to 0, pressure gets nearer to infinity" (or "as volume → 0, pressure → ∞"), meaning that the pressure gets bigger without limit. We cannot make the volume equal to 0 (no volume at all) so the pressure can never be "infinite"; but it is useful sometimes to write the above statement "When volume = 0, pressure = ∞". The two lines *AB*, *CD* meet at *P*. The smaller the angle between the lines, the further away is *P*. So as angle → 0, distance of *P* → ∞. If the lines are parallel, angle = 0; then it is convenient to say the lines meet "at infinity".



INFINITY

in'flamed (in'fleimd) – When a part of the body is damaged, or is attacked by bacteria, it becomes inflamed = red, hot, swollen, painful: **/-itis** at the end of a word means "**inflammation** of the . . ." e.g. **gastritis** = inflammation of the stomach.

in'flection (in'flekʃən) – bending or curving, e.g. of a line. **point of inflection** – The curve *AB* changes its way of curving at *P* (from *A* to *P* it curves outwards towards the left, from *P* to *B* it curves outwards towards the right): *P* is a point of inflection.



INFLECTION

'inflo'rescence ('inflɔ'resəns) – group of flowers growing together on a stem.

information theory – ↓communication.

'infra-/ ('infrə-) – below, e.g. **infra-red rays** – rays below the red end of the spectrum. Their wavelengths are greater than those of red light. They are heat rays and are used to give heat treatment in cases of rheumatism (muscular pain). Photographs can be taken by infra-red rays (using a special film): the rays pass through mist better than light rays.

INFUNDIBULUM

'infun'dibulum ('infʌn'dibjuləm) – ("no bottom") – part of an organ of the body shaped like a funnel, Y shaped.

in'fusion (in'fjuuʒən) – medicine made by putting vegetable matter (e.g. leaves) in water.

'Infu'soria ('infju'sɔɔriə) – very small creatures which live in water containing decaying vegetable matter, e.g. ↓ paramoecium; also called Ciliata (because of hair-like outgrowths (cilia) on the body).

in'gestion (in'dʒestʃən) – taking food into the body.

'ingot ('iŋgət) – piece of cast metal as it is sent to the works for rolling, etc. **ingot iron** – almost chemically pure iron.

in'grained ('in'greind) – with the colouring matter inside the fibres.

INGRAIN CARPET

'ingrain carpet – carpet woven like a piece of cloth, having no upstanding tufts: the surface is ribbed (made up of raised lines).

'inguinal ('iŋgwinəl) – having to do with the groin (the V-shaped hollow between front base of the body and the top of the legs).

in'hibit (in'hibit) – stop, cause not to act, control the action of, e.g. "inhibit one's desire to fight". **inhibitor** – substance which prevents a chemical action (e.g. of a ↓ catalyst or enzyme) or slows it down. A **non-specific inhibitor** (e.g. cyanide) changes the enzyme so that it cannot work at all; a **specific inhibitor** or **competitive inhibitor** combines with the substance on which the enzyme acts and so prevents the action of the enzyme.

in'ject (in'dʒekt) – push liquid into, e.g. a liquid drug under the skin with a needle. **injection moulding** – shaping plastics by pushing liquid plastic out of a hot pipe into a cold mould.

injector (of steam-engine) – instrument for forcing water into the boiler against the pressure of the steam inside the boiler.

in'lay (in'lei) – to set pieces of wood (metal, etc.) into holes cut in the surface of wood, metal, etc. as a way of decorating (e.g.) furniture: noun, **'inlay.**

'inlier ('inlaiə) – mass of older rock lying in among newer rock.

i'nnate (i'neit) – born in, e.g. "an innate tendency to get a certain disease".

'innervate ('inəveit) – supply nerves to; cause a muscle to act by means of a nerve.

i'nnominate (i'nɔminət) – having no name, e.g. the big flat bone on each side of the pelvis (bone at base of body into which the legs fit).

i'noculate (i'nɔkjuleit) – (*in-* + *ocul-* = an eye, a bud): put into the body the bacteria (or weakened bacteria) of a disease so as to cause a less severe attack which will protect against the disease; put a small crystal into a strong solution of a chemical so as to start off crystallization.

'inor'ganic 'chemistry – the study of all elements (and their compounds) other than carbon; organic chemistry is the study of carbon compounds: (some compounds containing carbon, e.g. carbonates, enter into inorganic chemistry).

'inquiline ('inkwilain) – creature which shares the home and food of another creature, e.g. insects other than ants in an ants' nest: some are harmful (e.g. wax moth), some are not.

in'seminate (in'semineit) – put semen (male reproductive cells) into.

in'sertion (in'səəʃən) – (1) place where (or way in which) an outgrowing piece fits in, e.g. side-stem into stem of a plant, of muscle to bone; (2) ornamental material (e.g. lace) sewn into (or on to the edge of) a dress.

'inset – an extra page (e.g. map) put into a book; to start a line of print further in than the other lines, e.g. at a new paragraph.

in'sidious (insidiəs) (onset of disease) – very gradual so that it is hardly noticed.

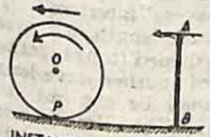
'inso'lation ('inso'leiʃən) – sending out of light and heat rays by the sun; rate of receiving of sunlight and heat by a certain area.

in'somnia (in'sɔmniə) – not being able to sleep well.

'inspis'sate – to thicken a liquid, e.g. by evaporation of water from it.

'instan'taneous ('instən'teiniəs) – lasting only for a moment, e.g. **instantaneous exposure** = snapshot = photograph taken in (e.g.) 1/25th or less of a second.

instantaneous centre of rotation – When a wheel (e.g. of a cart) rolls along a road, it turns round an axle *O*. For a moment, the point *P* is fixed and the cart swings about *P* just as if the wheel were a stick like *AB*. *P* is the instantaneous centre of rotation.



INSTANTANEOUS CENTRE OF ROTATION

'instinct ('instiŋkt) – inborn tendency to act in a certain way, e.g. sex-instinct, self-preservation (saving oneself from danger); in birds, nest building; the work of ants and bees. The word is not often used in scientific writing as it has a range of meanings.

'insufflate ('insʌfleit) – blow powder (vapour, smoke, etc.) into.

'insulate ('insjuleit) – separate off; prevent electricity from getting out of a wire by covering it with rubber (etc.); prevent loss of heat by covering a pipe with cloth or ↓asbestos. **insulator** – instrument used to stop the flow of electricity, e.g. the white pottery blocks which carry wires on telegraph poles; substance used to prevent loss of electricity from a wire, e.g. rubber is an insulator.

'insulin ('insjulin) – substance produced in Islands of Langerhans (part of the ↓pancreas). It enables muscles (etc.) to take up sugar from the blood and break it down as a way of getting energy. In the disease diabetes this substance is not produced, so sugar increases in the blood. Insulin, got from the pancreas of healthy animals, is injected into persons suffering from diabetes. It is used in ↓convulsion therapy. ↓Langerhans.

in'taglio (in'taaliou) – design cut down into the material as in a seal (for making designs in melted wax, e.g. on postal-covers). **in'taglio printing** – printing from a plate with sunk hollows in it which hold the ink.

'integer ('intidʒə) – a whole number, e.g. 3, 100, but not 2½.

'integral 'calculus – ↓calculus.

'inte'gration ('inte'greiʃən) – joining together parts to make a whole which works together as one, e.g. integration of desires, etc., in the mind to make up one's character.

in'tegument (in'tegjumənt) – outer layer of cells, e.g. round an ovule (small undeveloped seed in a flower).

in'telligence 'quotient (-'kwouʃənt) – Suppose the intelligence (inborn mind-power, power of reasoning, understanding, etc.) of a child, as measured by standard tests, is that of an average child of 9, but his age (time since he was born) is 10; his intelligence quotient is 9/10 = 90 as a percentage.

$$\text{I.Q.} = \frac{\text{age by intelligence test}}{\text{real age}} \times 100.$$

An average child has an I.Q. of 100, a very intelligent child 120–130, a dull child 80–90, or less.

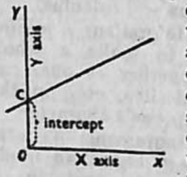
in'tensify (in'tensifai) – make stronger, e.g. make the dark parts darker in a photographic film.

in'tensity – bigness, strength, etc.; e.g. intensity of sound = loudness; intensity of a lamp = brightness; intensity of magnetization = how strongly a piece of iron is magnetized (measured as the magnetic ↓moment divided by the volume of the magnet); intensity of a magnetic or electric field = the strength of the field: ↓ oersted.

in'tention 'tremor (- 'tremə) – shaking of the hands whenever the person is doing (or about to do) something, but not when the hands are at rest. Stuttering ("B-b-butter, p-p-please") is a form of intention tremor.

inter-/ – between, e.g. **'inter'action** – action of *A* on *B* and of *B* on *A*. **'inter'calary** ('intə'kæləri) – in between other things in a line, e.g. intercalary cell – between two other (different) cells. February 29th (the extra day in leap year) is an intercalary day. **'inter'cellular** ('intə'seljulə) – between the cells (of a plant or animal).

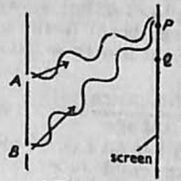
'intercept ('intəsept) – piece of a line cut off: in graphs, the distance which a line or curve cuts off on the *OY* or *OX* axis measured from the origin (*O*). *OC* is the intercept on the *OY* axis.



INTERCEPT

'interface – the surface which separates two substances, e.g. the interface between oil and water on which it is floating.

'inter'ference (of light) – See diagram: light passes through two pinholes, *A* and *B*. The two light waves reach a point *P* on a screen so that the "tops" of the waves are together: they strengthen each other and cause a stronger light at *P*. At some other point *Q* the waves which come may be such that the "top" of one wave meets a "hollow" of the other wave: they destroy each other and cause darkness. So the screen is lit up with bright strips (as at *P*) with dark strips between (as at *Q*). These strips are **interference fringes**: ↓ Newton's rings. When light passes into a thin film (e.g. of a soap bubble) waves are reflected from the near-side of the film and from the back (far side) of the film. These two waves "interfere". The light of one wave-length (e.g. green) may be strengthened (tops together), but the light of another wave-length (e.g. violet) may be cut out (tops meet hollows). The film therefore appears coloured, because certain colours are cut out and other colours are strengthened.



INTERFERENCE

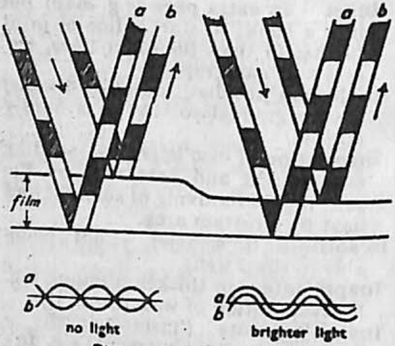
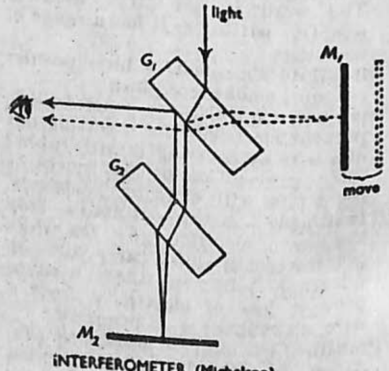


Diagram showing principle of INTERFERENCE FRINGES

Other forms of waves (e.g. radio waves, sound waves) similarly give interference effects.

'interfe'rometer (-fə'rɔmitə) – instrument used for measuring wave-lengths of light, radio waves, etc., by means of interference. See diagram



INTERFEROMETER (Michelson)

of Michelson's interferometer. The light is divided in glass-plate G_1; part goes to mirror M_1 (which can be moved backwards and forwards); part goes to mirror M_2 (which is fixed). The two parts of the light come back together and form interference fringes. Suppose the middle fringe is bright (waves in step). If M_1 is slowly moved back the middle fringe becomes black (waves out of step), then bright again. . . . From the distance through which M_1 is moved and the number of changes of the fringes, the wavelength can be worked out.

'inter'feron ('intə'fiiərən) – substance produced by one kind of ↓ virus which interferes with (upsets, prevents) the growth of other living viruses.

interlaced scanning – The beam of electrons in a television set passes along lines 1, 3, 5, etc., and then starts a new square and covers lines 2, 4, 6, etc. This gives more whole pictures per second than a 1, 2, 3, 4, 5 . . . movement, and so produces a steadier image. ↓ iconoscope for diagram.

'inter'mediate compound – chemical compound (made from a simpler one) from which other more complicated and important substances are made; e.g. benzene-sulphonic acids are made from benzene, and from them many dyes are made. The benzene-sulphonic acids are "intermediate" in making certain dyes.

'inter'mediate frequency – alternating currents of a frequency less than the frequency of radio waves but greater than the frequency corresponding to sound. ↓ superheterodyne.

'inter'mediate host – Host = organism in which a parasite lives. The Liver fluke lives first in the body of a snail then in the liver of a sheep; the snail is the intermediate host.

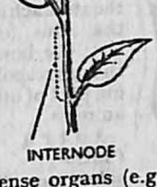
'inter'mission (of fever) – stopping for a short time but starting again later. **'inter'mittent** – coming on and then going off and coming on again.

in'ternal com'bustion engine (in'təənəl kəm'bʌstʃən) – engine in which the petrol (oil, gas) is exploded inside the cylinder, as in a motor-car – not burned outside in a fire to heat a boiler as in a steam-engine.

'inter'national date line ↓ date line.

'inter'national unit – unit (or measure) whose size has been agreed on by scientists in all countries, e.g. the International Ohm is fixed as the resistance of a column of mercury of certain size and quality.

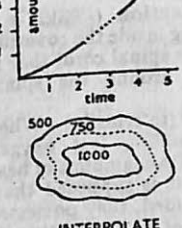
'internode ('intənoud) – the piece of a plant-stem between two nodes (places where leaves grow).



INTERNODE

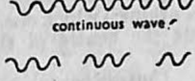
'intero-/ – inside, **'intero'ceptor** ('intəro'septə) – nerve which brings sensations from inside the body, not from sense organs (e.g. eyes, ears, touch) telling of things outside.

in'terpolate (in'təəpəleit) – fill in part of a mathematical curve by guessing or calculating from what has gone before and what comes after; fill in contour lines (showing height of land) by looking at the lines on each side. ↓ /-polate.



INTERPOLATE

'inte'rrupted con'tinuous wave ('intə'rʌptid) – A ↓ continuous wave gives no sound in an ordinary radio receiver; an interrupted continuous wave is divided into pieces so that it produces a sound in an ordinary receiver: used in sending telegraphic messages.



INTERRUPTED CONTINUOUS WAVE

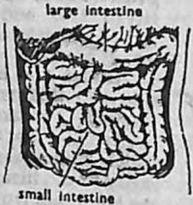
'inter'section of two lines – point at which one line cuts across the other.

in′terstices (in′təəstisiz) – spaces between, e.g. holes in a net.

′inter′stitial compound (′intə′stiʃiəl) – crystal with its main frame or shape made of atoms of *X* (one element) with atoms of *Y* filled in the spaces between the *X* atoms. **′inter′stitial tissue** – supporting tissue in between the special tissue of an organ, e.g. of the kidney.

′interval, musical interval – the "distance" between a musical note and a higher or lower note.

in′testine (in′testin) – in ↓vertebrate animals, that part of the food canal between the stomach and the anus (outlet); the bowel; the corresponding part of other animals.



INTESTINE

intra- (′intrə-) – inside, e.g. **′intra′cellular** – inside the cell. **′intra′venous** (-′viinəs) – inside a vein.

in′trados (in′treidɔs) – the underside of an arch.

′intra′thecal in′jection (-′θiikl -) – injection of a drug inside the covering membrane of the spinal cord, that is into the liquid around the spinal cord.

in′trinsic ′energy (in′trinsik-) – When two elements combine (e.g. oxygen and carbon) a certain amount of heat is produced: so it is supposed that, *before* they combined, they possessed an amount of heat = their Intrinsic Energy.

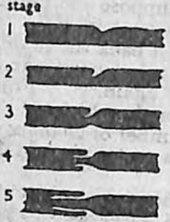
′introrse anther (′intrɔɔs ′ænθə) – anther (pollen container) which opens inwards towards the centre of the flower.

′intros′pection (′intrəs′pekʃn) – looking within oneself, thinking about one's own thoughts and feelings.

in′trusive rocks (in′truusiv) – rocks formed below the ground by the cooling of melted rocks which have been pushed into spaces between other rocks: (extrusive rocks = rocks formed from melted rock which has been pushed out of the ground).

′intubate (′intjubeit) – put a tube into, e.g. into the trachea (air pipe of throat) so as to allow breathing when the trachea is blocked.

′intussu′sception (of the bowel) (′intʌsʌ′sepʃən) – condition when part of the bowel gets inside another part (a tube within a tube); the movements of the bowel make the conditions worse.



INTUSSUSCEPTION

′inulin (′injulin) – substance (closely related to fruit-sugar, but not sweet) contained in artichokes and roots of the Compositae (daisy) family; used to make ↓fructose (fruit sugar).

in′vagi′nation (in′vædʒin-) – developing a hollow inward growth (as when one side of a soft hollow ball is pushed inwards).

′Invar (′invaa) – alloy of iron and nickel; it expands very little with heat; used in clocks and scientific instruments: (trade name).

in′verse (in′vəəs) – opposite way round, e.g. **inverse ratio** – as *X* becomes bigger, *Y* becomes smaller.

in′verse ′function – If y is a certain function of x (is related to x in a certain way), x is an inverse function of y (i.e. is related to it in an opposite way). Example: if $y = x^2$, $x = \sqrt{y}$.

′inverse square law – The brightness of a beam of light from a "point" (very small) source (also the force of attraction of the pole of a magnet, force of gravity, etc.) becomes less with distance. At 2 feet it is $\frac{1}{4}$ ($\frac{1}{2} \times \frac{1}{2}$) of its value at 1 foot, at 3 feet it is $\frac{1}{6}$ ($\frac{1}{3} \times \frac{1}{3}$), etc., i.e. it decreases according to the square of the distance.

′invert sugar – A solution of sucrose (the sugar of sugar-cane) twists a beam of ↓polarized light to the right: fructose (fruit-sugar) turns it to the left. When cane-sugar is chemically changed into a mixture of glucose and fructose the solution twists polarized light to the left (instead of to the right as before). Sugar so changed is called Invert sugar.

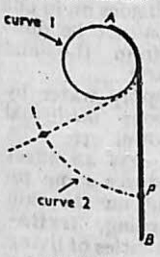
'inver'tase – substance produced by yeast which inverts sugar (as above).

in'vertebrates, in'verte'brata (in-'vəətibreitz) – the very large group of animals which do not have backbones, e.g. insects, worms, snails, etc.

in 'vitro (- 'vitrou), **in vivo** (- 'viivou) – ("in glass," "in living"): A medical experiment **in vitro** is done in the laboratory, e.g. to find if a certain chemical kills certain bacteria; the experiment is done in glass containers. An **in vivo** experiment tries the effect of the chemical on the bacteria in a living animal or a person.

involucr-/ – in which something is rolled up as in a tube, e.g. **'invo'lucre** ('invɔ'ljuukə) – close group of small leaves round the base of a flower.

'invo'lute ('invə'ljuut) – with edges rolled inwards. (Maths.) – Imagine a piece of string *AB* fixed to a point *A* of curve 1 (e.g. a circle); if the string is held tightly and gradually wound round curve 1, any point on the string (such as *P*) marks out a second curve. Curve 2 is an **involute** of curve 1. Curve 1 is the **evolute** of curve 2. Involutes are important in designing the teeth of gear wheels.



INVOLUTE AND EVOLUTE

'invo'lution (state of mind) – e.g. **involutional melancholia** – becoming more and more shut up within oneself and taking less and less notice of the outside world.

'iodates ('aiədeitz) – salts of iodic acid (the acid of ↓ iodine) e.g. potassium iodate, KIO_3. **iodides** (-daidz) – salts of hydriodic acid, HI, e.g. potassium iodide (KI), used in medicine, e.g. in cases of long-lasting inflammation.

'iodine ('aiədiin) – non-metallic chemical element; found, e.g., as a compound in sea-weed. A solution of iodine is commonly used as a (dark red) antiseptic on cuts and small wounds. Iodine is used by the ↓ thyroid gland, and lack of it in the drinking water is one of the causes of goitre (swelling in front of the neck caused by enlargement of the thyroid gland).

i'odoform (ai'ɔdofɔɔm) – CHI_3, a yellow crystalline compound formerly much used as an antiseptic, e.g. on dressings for wounds.

'ion ('aiən) – atom which lacks its full number of electrons (and so is positively charged) or which has too many electrons (and so is negatively charged). So also a molecule or radical (group of atoms, e.g. SO_4) may form an ion. Ions carry electricity through a liquid (↓ electrolysis) and (in part) through a gas. **'ionized** ('aiənaizd) – having become an ion – by the loss or gain of an electron; having had ions formed in it, e.g. an **ionized gas. 'ionizing radiation** – radiation (particularly X-rays, ↓ cosmic rays, rays from radioactive substances) which produces ions in materials through which it passes.

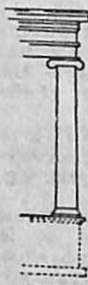
ion chamber – instrument for measuring ionizing radiation. The radiation ionizes the gas inside the instrument and the current which can flow through the gas (under a given voltage) is measured.

ion exchange – method of removing ions of one kind from a solution (and putting others in their place) by passing the solution through columns of minerals, resins, etc. (↓ zeolite). Used, e.g. in softening water and in the extraction of uranium.

ion gauge – instrument for measuring very low gas pressures. The gas is ionized with a hot wire and the amount of gas found by measuring the amount of ionization.

ion microscope (**field emission microscope**) – instrument for photographing the arrangement of the atoms on the surface of a crystal. Gas atoms (e.g. helium) touch the crystal, become ionized, and travel under electric forces to a photographic plate.

I'onic architecture (ai'ɔnik) – way of building with pillars as shown.



IONIC

'ionones ('aiənounz) – chemical substances with a strong smell of violets, used in soap-making, etc.; similar to irone.

'ionophor'esis = ↓ electrophoresis.

i'onosphere (ai'ɔnəsfiə) – various layers from 30 to 250 miles above the surface of the Earth where the air is ionized by the *ultra-violet rays of the sun. This causes the air to reflect radio beams: *(very short waves of light, too short to be seen by the eye): for diagram see Heaviside which is part of the ionosphere.

'ipe'cac, 'ipe'cacu'anha (-'ipikækiu-'aanə) – substance obtained from a Brazilian plant; it contains emetine; used to produce vomiting: it also causes sweating, and is used to loosen a cough.

Ir – chemical sign for ↓iridium.

irid-/ – of the iris (coloured centre part of the eye), e.g. **'iri'dectomy** ('airi'dektəmi) – cutting away part of the iris.

'iri'descent ('iri'desnt) – having colours on the surface like mother-of-pearl (inside of sea-shell) or a soap-bubble, caused by ↓interference of light.

i'ridium (ai'ridiəm) – metal element; very hard; used (e.g.) to make the little white points on the end of the gold nib of a fountain-pen.

IRIDIUM

'iris ('airis) – the coloured centre part of the eye. **iris diaphragm** (-'daiəfræm) – plates lying over each other behind the lens in a photographic camera which can be moved to give a smaller or larger opening in the centre. (For picture see diaphragm.)

'irone ('airoun) – chemical substance which has a strong smell of violets, used in soap making.

iron-lung – instrument used when the power of breathing is weak or lost. It is an air-tight box in which such a person is put (except the head): the air pressure in the box is increased and decreased in such a way as to cause the lungs to be compressed and expanded as in breathing, so drawing in and sending out air; also called Drinker apparatus. (For picture see Drinker.)

iron py'rites (- pi'raitiiz) – golden-coloured crystaline iron sulphide.

'ironstone – hard masses of carbonate of iron and clay found in coal mines, used in making pottery.

ir'radiate (i'reidieit) – cause rays (e.g. ultra-violet rays, infra-red rays, X-rays) to fall on.

ir'rational number (i'ræʃənl) – a number which can be thought of, though it cannot be written in figures exactly, e.g. $\sqrt{2} = 1{\cdot}414\ldots$

irre'versible action (iri'vəəsəbl) – a chemical action which goes on in one direction only and cannot be done again backwards (from the end result back to the start).

'irrigate ('irigeit) – supply water by canals to fields: pour medicinal liquid into the eye, bowel, etc.

'irritant – that which has an effect on the nerves and causes some reaction, e.g. an irritant on the skin causes redness and burning. **'irrita'bility** – one of the qualities of living matter; the responding to (reacting to) a stimulus. **'counter-'irritant** – a substance used to draw blood to the skin and parts just below it – also to draw away blood from parts deeper in the body: used to lessen muscular pain (e.g. in rheumatism, lumbago, sciatica).

'irritate – excite, cause nervous action in; cause a sensation on the skin so that one scratches it.

isch-/ – ("stop, prevent"): stopping or lessening of – e.g. **is'chaemia** (is'kiimiə) – stopping of the blood supply to a part, e.g. by blocking of a blood vessel. **is'churia** (is'kjuuriə) – stopping or lessening of the flow of urine by blocking of the passage or by disorder of the kidney.

'ischium ('iskiəm) – that part of the pelvis (large ring of bone at base of body) on which one sits: for drawing see pelvis.

'isinglass ('aiziŋ'glaas) – white jelly made from fish, used to make glue, to preserve eggs, to make beer clear.

'iso-/ – ('aiso-) – equal, same; e.g. ↓ isochronous.

iso-/ – used in forming the names of ↓ 'isomers, e.g. 'iso'butane.

'isobar ('aisobaa) – line drawn on a map through different places which have the same barometer-pressure at the same time. Similarly, **'iso'haline** (-heilain) – places which have the same saltness in the sea; **'iso'hel** (-hiil) – places which have the same amount of sunshine; **'iso'hyet** (-haiet) – places which have the same amount of rainfall; **'iso'neph** (-nef) – places which have the same cloudiness; **'iso'therm** – places which have the same temperature.

'iso'bares ('aiso'beəz) – atoms having different chemical properties, but the same atomic weight, e.g. a certain ↓ isotope of calcium and of argon.

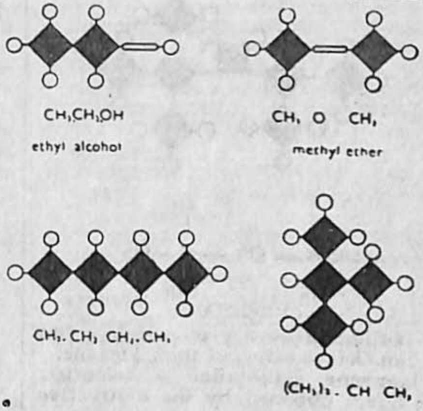
i'sochronous (ai'sɔkrənəs) – of the same length of time, e.g. the swings of a pendulum are isochronous.

'isoe'lectric point – point at which there is such an amount of acid in a ↓ colloid that the particles are neither positive nor negative, and so tend to separate and settle down from the liquid.

'iso'gonic line (-'gɔnik) – line on the map showing places in which the difference of compass-north from true north is the same.

iso'leucine – an ↓ essential amino-acid.

'iso'mers ('aiso'məəz) – substances whose molecules are made of the same numbers of the same atoms, but the atoms are differently arranged, e.g. – (1) ethyl alcohol ($CH_3CH_2.OH$) and methyl ether (CH_3OCH_3) (substances not related); both are C_2H_6O. (2) butane $CH_3.CH_2.CH_2.CH_3$ and isobutane $(CH_3)_2CH\cdot CH_3$ (substances similar). (3) the two forms of lactic acid: here the atoms are joined in the same way but are differently arranged in space: ↓ stereo-isomerism. A change from one substance into an isomer (i.e. rearrangement of atoms, not gaining or losing any atoms), is an **isomeric change.**


CH_3CH_2OH ethyl alcohol

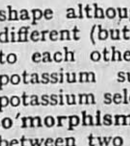
CH_3 O CH_3 methyl ether

$CH_3.CH_2$ $CH_2.CH_3$ butane

$(CH_3)_2.$ CH CH_3 isobutane

ISOMERS

'iso'metric pro'jection ('aiso'metrik-prə'dʒekʃən) – drawing a picture as from a position above one corner so that three sides are seen at once.

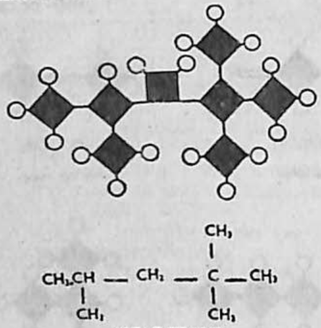


ISOMETRIC

'iso'morphic crystals ('aiso'mɔɔfik -) – crystals of the same shape although the substances are different (but usually closely related to each other), e.g. ↓ alums, also potassium sulphate (K_2SO_4) and potassium selenate (K_2SeO_4).

'iso'morphism – apparent likeness between two creatures which really come from different origins and belong to different classes.

'iso-'octane ('aiso.'ɔktein) – the ideal (perfect) motor-spirit (petrol) with which other motor-spirits are compared in regard to their tendency NOT to explode suddenly and so knock (make a "ping-ping" noise in the engine). Petrol as good in

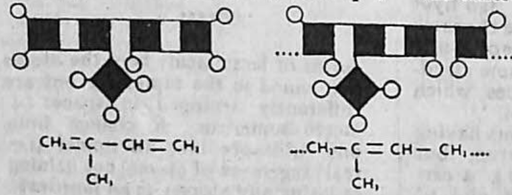


$$\begin{array}{ccccc} & & & CH_3 & \\ & & & | & \\ CH_3.CH & — & CH_2 & — C — & CH_3 \\ | & & & | & \\ CH_3 & & & CH_3 & \end{array}$$

ISO-OCTANE

antiknock quality as iso-octane has an Octane rating of 100: ↓octane.

'isoprene ('aisopriin) – colourless liquid obtained by the destructive heating of rubber; rubber is built up from chains of isoprene molecules.



$CH_2{=}\underset{\substack{|\\ CH_3}}{C}{-}CH{=}CH_2$ ...$CH_2{-}\underset{\substack{|\\ CH_3}}{C}{=}CH{-}CH_2$...

isoprene molecule

isoprene unit in rubber

ISOPRENE

'iso'propyl 'alcohol ('aiso'proupil) – Propyl alcohol = $CH_3.CH_2.CH_2.OH$; isopropyl alcohol is an ↓isomer with formula $(CH_3)_2CHOH$. It is used very widely in making perfumes, varnish, etc., instead of ethyl alcohol.

Isoptera (ai'sɔptərə) – the class of white ants (termites).

i'sosceles triangle (ai'sɔsəliiz) – triangle having two sides equal.

'isotherm – ↓isothermal lines.

'iso'thermal change ('aiso'θəəməl) – a change (e.g. the very slow expansion of a gas) which takes place without any change in temperature.

'iso'thermal lines, 'isotherms – lines on the map through places which have the same temperature: lines on a graph showing the relation of changes of volume and changes of pressure of a gas when the gas is kept at the same temperature.

'iso'tonic liquids ('aiso'tɔnik) – solutions having the same strength. A stronger solution draws out liquid from a weaker solution so as to make two equal solutions (↓osmosis). So a non-isotonic solution put (e.g.) in the eye, causes pain, but an isotonic solution is not felt; so also in the case of injections.

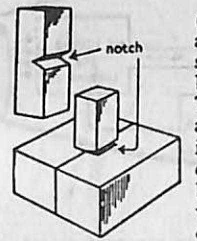
'isotopes ('aisotoups) – atoms of different atomic weight, but chemically the same substance, e.g. hydrogen (atomic weight, 1) and heavy hydrogen (atomic weight, 2). Heavy hydrogen has one ↓neutron in the nucleus, but ordinary hydrogen has not. So also uranium (as found in the earth) is a mixture of the isotopes with atomic weights 235 and U 238: the difference is due to the different number of neutrons. **Radioactive isotopes** (**radio-isotopes**) are unstable (not steady, not fixed) forms of elements: they send out rays, like radium, and change. They are important in medicine because they make it possible to study the path and speed of passing of an element through the body.

'isotron ('aisotrɔn) – instrument for separating light ↓isotopes and heavy isotopes from a substance. It is based on the fact that a rapidly changing magnetic field tends to change the speed of light atoms more than it does the heavy atoms.

'iso'tropic – having the same properties (qualities), e.g. expansion, electrical conductivity, in all directions, e.g. glass is isotropic but wood is not.

/-ite (-ait) – a salt which contains less oxygen than another similar salt, e.g. sodium sulph**ite** Na_2SO_3 (from sulphur**ous** acid H_2SO_3), sodium sulphate NO_2SO_4 (from sulphur**ic** acid H_2SO_4). So also other acids.

/-'itis ('-aitis) – inflammation of – e.g. **gastr-/** – stomach; **gastritis** – inflammation of the stomach; so also **dermatitis** (skin), **laryngitis**, etc.



IZOD TEST

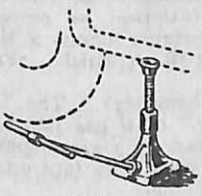
'Izod test ('aizɔd) – test of ability of a substance to resist a blow (↓impact). The test piece has a V-shaped cut in it, and is arranged as shown: the blow is struck with a pendulum of a certain weight and velocity (speed).

J

– sign used in electrical calculations for $\sqrt{-1}$; $j^2 = -1$: (in mathematics **i** is used, but as i is sometimes used to show a current, j is used instead in electrical calculations): ↓imaginary numbers.

J – Joule's equivalent = the ↓mechanical equivalent of heat.

'jabo'randi ('dʒæbɔ'rændi) – plant from which *pilocarpine is obtained: *(drug used to cause sweating).



JACK

jack – instrument for raising heavy weight, e.g. a motor-car jack to raise a car when changing a wheel.

jack-plane – large plane (tool) about 16 inches long.

'jacket – outer covering, e.g. **water-jacket** used to keep a container or engine cool: (of book) – loose paper cover, often with a picture on it; also called "dust cover".

Jack'sonian 'epilepsy (dʒæk'souniən 'epilepsi) – a seizure in which there are sudden uncontrolled movements of a single muscle, gradually spreading to other muscles, with or without loss of consciousness; due perhaps to earlier brain injury.

'jaco'net ('dʒækɔ'net) – thin cotton-cloth waterproofed on one side, used for medical dressings.

'jacquard loom ('dʒækaad) – machine for weaving complicated designs. The raising of the warp (longways threads) is controlled by cards with holes in them allowing rods (fixed on the warp threads) to pass through and so raise warp threads to make the design.

'jacti'tation ('dʒækti'teiʃən) – rapid, regular muscular movements due to lack of oxygen.

jade (dʒeid) – milky-green precious stone: (the word is used for several chemically different stones).

'jalousies ('dʒæluuziiz) – movable windows or curtains made of strips of wood at an angle to let in air but keep out sunlight.

jamb (dʒæm) – upright side of an opening, or posts at the side of an opening, e.g. **door jamb** – side of door opening. **chimney jamb** – side of fireplace.

jamming – causing one set of radio waves to be unhearable by sending out other waves on the same (or a very near) wavelength.

ja'panning (dʒə'pæniŋ) – covering metal (wood, etc.) with varnish or hard paint and then heating it to make a hard polished surface.

'jaundice ('dʒɔɔndis) – yellowness of the skin caused by ↓bile in the blood, or by breakdown of red blood-cells.

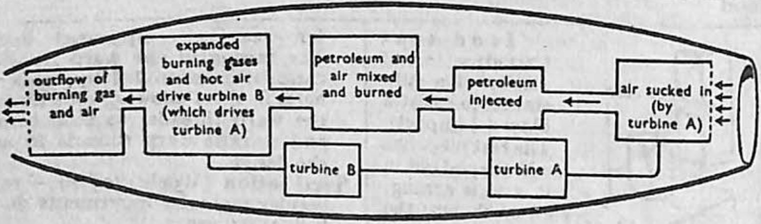
jean (dʒiin) – heavy cotton material with diagonal raised lines.

'Jeffcott ('dʒefkət) – form of ↓tacheometer.

je'junum (dʒi'dʒuunəm) – The small intestine is the upper part of the bowel: its first 10 to 12 inches is the duodenum; the next 8 or 9 feet is the jejunum, which leads (through the ileum) into the large intestine.

'jemmy ('dʒemi) – small bar used as a lever.

'jet pro'pulsion – causing an aeroplane to go forward by sucking in air in front, mixing it with oil, setting fire to it, and sending out the hot burnt gases at the back. The movement of the aircraft is a recoil ("jump back") similar to the recoil of a gun from firing a shot. The whole engine is a **jet-engine.** For drawing, see next page.


outflow of burning gas and air
expanded burning gases and hot air drive turbine B (which drives turbine A)
petroleum and air mixed and burned
petroleum injected
air sucked in (by turbine A)
turbine B
turbine A

JET PROPULSION

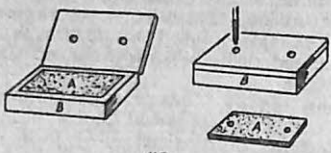
jet-stream – very strong, steady wind which blows at a great height in middle latitudes, e.g. over the North Atlantic where it blows westwards.

'jettison ('dʒetisən) – throw out goods to lighten a ship which is in difficulty. **'jetsam** ('dʒetsəm) – goods so thrown out.

'jewel hole – a jewel with a hole through it for the end of an axle of a watch-wheel; a D shape "cap jewel" (= "end stone") is put over the end.

jib – (1) the sloping bar of a crane; (2) three-cornered sail at the front of a sailing ship.

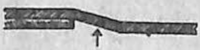
jig – any instrument used to guide the tool or to hold the material in the right position for cutting, shaping, or fitting together: e.g. in the diagram piece *A* is put in box *B* and holes are drilled through holes in the top of the box: *B* is the jig.



JIG

'jigger – parasite (e.g. in Africa) which gets below the skin and makes painful places: ↓chigger.

'joggle – small piece standing out from a block of stone (or metal piece set out from a cement block) fitting into a hollow in the next block to prevent sideways movement; angle in a piece of metal so that another piece of metal may fit in under it.



JOGGLE

Johne's disease (dʒounz -) – infectious disease of the bowel in cattle and sheep.

joist – wooden or steel beam holding up a floor.

joule (dʒuul) – unit of work or energy, equal roughly to that done in lifting ¾ lb. through a height of 1 foot: (strictly equal to 10,000,000 ergs). The rate of using (or producing) 1 joule per second is called a ↓watt.

'Joule's law – rule for calculating the amount of heat produced when a certain current flows through a wire of a certain resistance for a certain time: Heat (calories) = current^2 (amps.) × resistance (ohms) × time (secs.) ÷ 4·18. (British, 1818–1889.)

Joule's law (chemistry) – The "intrinsic energy" of a gas (store of energy possessed by a gas) depends on its temperature only (not on its pressure or volume).

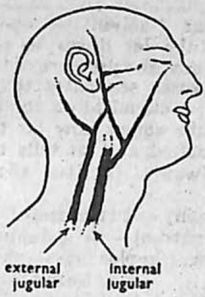
Joule's mechanical equivalent of heat – ↓mechanical.

Joule-Thomson effect, Joule-Kelvin effect – When most gases (except hydrogen) expand through a *porous substance, the outcoming gas is cooled because work is done in forcing the molecules of the gas apart against the force of attraction between them: *(e.g. soft pottery).

'journal ('dʒəənl) – the part of an axle which is held by a bearing. **journal-bearing** – bearing in which the axle is turning but is not pushing anything; the bearing of the axle of a ship's propeller is a thrust bearing.

not a journal-bearing.

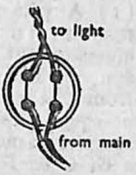
'joystick – the control bar of an aeroplane held in the pilot's (airman's) hand.



JUGULAR

'jugular ('dʒʌgjulə) – of the neck. **jugular veins** – veins carrying blood from the head.

'junction ('dʒʌŋkʃn) – joining, e.g. railway station where several lines join. **junction box** – box (often on the wall) where two or more sets of electric wires are joined, e.g. where the wires leading off to the lights of one room are joined to the main supply wires of the house.



JUNCTION BOX

'Jupiter ('dʒuupitə) – the largest planet, fifth in distance from the sun.

Ju'rassic system (dʒu'ræsik) – system of rock-layers in the Earth's surface consisting of limestone and slates formed from 140 to 170 million years ago; the age of giant lizards and the first birds.

'justify ('dʒʌstifai) – set out the words in a line of printer's type so as to fill the line.

jute (dʒuut) – plant (of same family as Mallow, Hollyhock, Hibiscus) grown in Bengal to supply fibre of which bags, sacks, packing-cloth (etc.) are made.

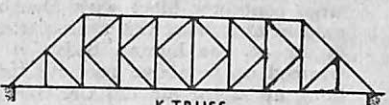
K

K – chemical sign for ↓ potassium.

K degrees (e.g. 273° K.) – temperature on the Kelvin scale measuring from ↓ absolute zero; water freezes at 273° K and boils at 373° K (100° C. + 273).

K shell – innermost layer of orbits of (not more than) 2 electrons round the nucleus of an atom: **the K series** of very short X-rays comes from electrons in the K shell: ↓ X-ray spectrometer. So also L shell (second from the inside, up to 8 electrons); M shell (third) . . . etc. **K capture** – a change in the nucleus of a radioactive atom due to the absorption of one of the electrons of the K shell.

K truss (- trʌs) – arrangement of metal beams, as shown, used especially in ↓ cantilever bridges.



K TRUSS

'Kainit, 'Kainite ('keinit, -nait) – a fertilizer containing salts of potassium and magnesium: (trade name).

'Kaino'zoic – ↓ Cainozoic.

'kala-a'zar ('kaala-a'zaa) – "Black fever," a disease like malaria but more dangerous; caused by a microscopic parasite ↓ *Leishmania donovani*; carried by a mosquito, small fly or bed-bug.

kames (keimz) – round sand-hills (formed by water flowing out from melting ice).

'kaolin ('keiəlin) – china-clay; used in medicine as a dusting powder, and as a heated paste for poultices (hot dressings); for making fine china (pottery), for the very smooth surface of paper, etc., etc.

'kapok ('keipɔk) – seed-hairs of the kapok tree (Java) used for filling cushions and for floating coats to save life at sea.

'karat – ↓ carat.

'karyo-/ ('kærio-) – having to do with the nucleus (karyon) of a cell, e.g. **'karyoki'nesis** (-kai'niisis) – division of the nucleus as a part of the growth-division (mitosis) of a cell. **'karyolymph** – liquid part of the nucleus. **kary'olysis** (kæri'ɔlisis) – break-up of the nucleus when the cell dies; **'karyo'litic** adj.

kata-/ (kætə-) – down. **'kata'batic wind** – wind caused by downward movement, e.g. of cold air into a valley.

ka'tabolism (kæ'tæbəlizm) – the breaking down of complex substances in the body into simpler substances with production of energy.

katalepsy, katalyst, kataphoresis, ↓cata-/.

'kataplexy (kætəpleksi) – (in an animal) – pretending to be dead: ↓cataplexy.

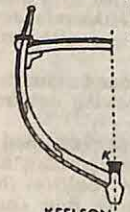
'kata-ther'mometer ('kætəθə-'mɔmitə) – thermometer (with a large container filled with alcohol) used in measuring the cooling effect of air on the human body: it is warmed up to above 100° F., then hung up in the air and the time is noted till it cools to 95°. The markings show loss of heat per square centimetre of the surface of the container.

katatonia, kathode, kation – ↓cat-/.

kc., kc.p.s. – ↓kilocycle.

keel – the lowest, central, beam of a ship from which the whole ship is built up: lower part of a pea/bean flower: ↓carina.

'keelson, 'kelson ('kelsən) – piece (built on to the keel) in which the bottom of the mast is held; the ribs (side-beams) of the ship are built into the kelson.

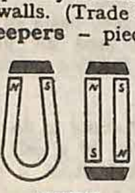


KEELSON

'Keene's cement – quickly solidifying plaster used for walls. (Trade name.)

'keepers – pieces of iron placed on or near the ends of magnets (when not being used) to help to keep the magnets strong.

'keloid growth ('kiilɔid) – an excessive growth of *scar tissue, e.g. on a burn, causing the surrounding skin to be dragged in as by the claw (*chele* = claw) of a bird: *(thick new tissue covering a wound).



KEEPERS

kelp (kelp) – sea-weed.

'kelson – ↓keelson.

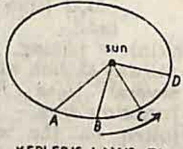
Kelvin scale – ↓K.

'Kelvin sounder ('kelvin) – open-ended glass tube let down to the bottom of the sea; the pressure of the deep water causes sea-water to go into the tube; a chemical on the inside of the tube shows how far the water has reached and so tells the depth of the water. (British, 1824–1907.)

'Kennelly ('kenəli) – ↓Heaviside.

'kenotron ('kiinətrɔn) – = ↓diode.

'Kepler's laws ('kepləz -) – three mathematical laws regarding the movements of the planets: (1) A planet moves in an ellipse about the sun; (2) The line from the planet to the sun marks out equal areas in equal times, e.g. if the planet moves from *A* to *B*, *B* to *C*, *C* to *D*, in equal times, the areas *SAB*, *SBC*, *SCD* are equal; (3) The (time taken for one orbit)^2 is proportional to the (average distance from the sun)^3. (German, 1571–1630.)



KEPLER'S LAWS (2)

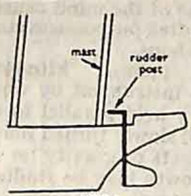
kera-/-t-/-o- /– (1) of horn; (2) of the transparent covering of the eye (the cornea). **'keratin** ('kerətin) – the substance of which horn, hair, finger-nails and the outside layer of the skin are composed. α (alpha) keratin is made of folded chains of molecules and is found in hair, wool, etc.: β (beta) keratin has straight molecules as in finger-nails, horn, etc. **'kera'titis** (-taitis) – inflammation of the cornea of the eye.

kerf (kəəf) – a saw-cut in (not through) a beam.

'kerosene ('kerəsiin) – paraffin oil: petroleum oil used in oil lamps (and in large motor engines, e.g. on the farm).

Kerr effect (kaa -) – the twisting of ↓polarized light by electrical means. Some transparent materials twist polarized light of their own accord; others when an electric force is applied across them – this is the Kerr effect.

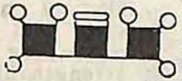
'kersey ('kəəzi) – very rough woollen cloth.



KETCH

ketch (ketʃ) – coast-trading sailing ship with two masts: the mast at the back is shorter and is some distance in front of the rudder-post (not behind it, as in a yawl).

'ketones ('kiitounz) – substances with the group C:O joined to two hydrocarbon groups, e.g. ↓acetone. **ketone bodies** – substances related to acetone found in the body when fat is incompletely oxidized. This condition is called **ke'tosis,** e.g. in ↓diabetes it produces **'keton'uria** (ketones in the urine).

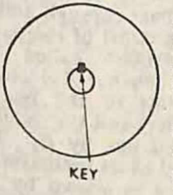


$CH_3.CO.CH_3$
acetone
KETONE

'kevel ('kevəl), **kevil** ('kevil) – (1) hammer (weighing 7 lbs.) with an edge at one end and a point at the other, used for stone-cutting; (2) another name for T-shaped piece on to which ropes are fixed in an 8 shape; also called cleat.

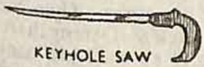
KEVEL (2)

key (engineering) – small block used to prevent a wheel from turning on its axle.



KEY

'keyhole saw – saw with a blade about ½ inch wide going to a point; new blades can be fitted into the handle.



KEYHOLE SAW

'keying – cutting a surface (e.g. of a wall) so that plaster can stick on to it.

'keystone – top centre stone in an arch.

'Kidderminster 'carpet ('kidəminstə -) – Ingrain carpet = woven floor-covering with a flat surface, made of strips of cloth in one direction and string in the other. For picture see Ingrain.

'kieselguhr ('kiizəlguuə) – a white powder composed of the skeletons of very small one-cell sea-organisms (↓diatoms): used in making explosives, e.g. dynamite; also for fireproof cements.

killed spirits – zinc dissolved in hydrochloric acid; used to make ↓solder stick to metal.

killed steel – steel freed of oxygen before casting, e.g. by adding manganese or aluminium.

kiln – furnace for making pottery or bricks or lime; also for drying wood, e.g. **kiln-dried wood.**

'kilo-/ ('kilou) – 1,000, e.g. **'kilogram** ('kiləgræm) = 1,000 grammes; **kilovolt** = 1,000 volts.

'kilocycles per second – 1,000's of cycles of alternating current or radio waves per second.

'kilogram 'calorie (- 'kæləri) amount of heat needed to raise 1 kilogram (1,000 grammes) of water from 15° C. to 16° C.

'kiloton – (of nuclear weapons) explosive force equivalent to that of 1,000 tons of T.N.T. (↓trinitrotoluene).

'kilowatt ('kilowɔt) = 1,000 ↓watts: (1 horse-power = 746 watts; 1 kilowatt = about 1⅓ horse-power).

'kilowatt-hour – the Board of Trade unit of electrical energy. The amount of energy used when energy (electric power) is taken at the rate of 1 kilowatt for 1 hour. Example: An electric heater takes electricity at the rate of 4 kilowatts: if it is used for 3 hours, energy used = 4 × 3 = 12 kilowatt-hours.

'kinaes'thetic sensations ('kainiis'θetik) – sensations (feelings) from the muscles, joints, etc., telling of movement or position of a part of the body. **kinaesthetic imagery** – the "feel" of an imaginary movement or position, e.g. think of hitting a very light ball, and then a very heavy ball, upwards with your hand.

ki'nase, /-kinase – a substance which causes an ↓enzyme to act; e.g. **'thromboki'nase** ('θrɔmboukai'neis (in the blood cells) does not itself clot (solidify) blood, but it causes another substance (the enzyme, prothrombase) to do so.

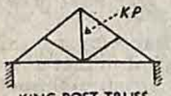
kine-/ – move; **/-ki'nesis** (kai'niisis) – movement (e.g. ↓ karyo-/).

'kine'matics ('kini'mætiks) – the study of speeds and accelerations (but not of the forces causing the movement).

ki'netic 'energy (kai'netik) – the energy of a moving Body, e.g. of flowing water: $\frac{1}{2}$ mass (in grammes) × speed^2 (in centimetres per second) = energy (in ergs); or $\frac{1}{2}$ mass (lbs.) × speed^2 (feet per second) = energy (foot-poundals).

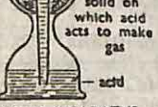
ki'netic theory of gases – the idea that gases are composed of rapidly moving molecules bouncing off each other and off the sides of the container. By means of the theory the gas laws (e.g. ↓ Boyle's law) can be explained.

king-pin – the pin holding the short axle of the front wheels of a motor-car on to the main axle (or, in some cars, on to the frame).



KING-POST-TRUSS

'king post – upright post in a **king-post-truss** – a set of beams, as shown, holding up a roof.



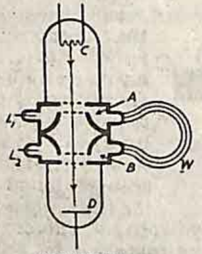
KIPP'S APPARATUS

'Kipp's appa'ratus – instrument used in a laboratory to generate and supply a gas. When the tap is opened, the acid rises up to the solid and makes the gas. When the tap is shut, the gas drives the acid back so that no more gas is made.

'Kirchhoff's 'law ('kiiəʃɔfs -) – an exact statement of the general fact that a surface which absorbs (takes in) light-waves and heat-waves well also emits (sends out) well, e.g. a black surface absorbs all the light which falls on it; a hot black surface emits light well. A surface which absorbs (e.g.) green light well, emits green light well if it is heated. (German, 1824–1887.)

'klepto'mania ('klepto'meiniə) – disordered state of the mind causing continual and often purposeless stealing, e.g. from shops.

klin-/ – slope; ↓ clin-/. **'klinostat** ('klainostæt) – instrument by which a plant, usually held parallel to the ground, may be slowly turned round, so that the effects of gravity on the direction of growth may be studied.



KLYSTRON

klystron ('klaistrɔn) – First see Oscillating current, Oscillator. A klystron is a kind of radio valve used for producing or strengthening oscillating currents of very high frequency (e.g. as used in ↓ radar). The drawing shows the main idea. The electrons from the cathode *C* pass through two boxes *A* and *B* and are at last collected by the plate *D*. Each box has a wire (L_1 and L_2) so that connections may be made to them to join the instrument with others. When an oscillating current is led in by L_1, oscillations are set up in the box (like oscillations in an aerial). The oscillations in the box change the speed of some of the electrons which pass through and so cause bunches (groups) of electrons. Box *A* is therefore called the Buncher. These bunches of electrons set up oscillations in the box *B* (called the Catcher) and the oscillating current is led out by L_2. The valve can be used as an oscillator by joining the boxes as shown by the looped line on the right. Then oscillations in *B* go back and strengthen the oscillations in *A* so that big oscillations are built up: ↓ cavity resonator.

knee jerk – a kick produced (as an uncontrolled nervous reaction) by giving a sharp blow on the front of the knee just below the knee-cap (the leg being crossed over the other leg); too great or too little movement is a sign of nervous disorder.

knocking – the noise "ping! ping!" made by a motor-car engine if it is suddenly given more petrol, e.g. when going up a hill in top gear. Knocking is caused by detonation (sudden rapid explosion) of the petrol vapour, causing pressure-waves reflected backwards and upwards through the cylinder, instead of the steady downward explosion needed to drive the piston. ↓octane number.

knop (nɔp) – lump (small mass) in a thread, e.g. in weaving.

knot – unit of speed of a ship, 6,080 feet per hour.

'knurled ('nəəld) – with cuts on the circular head (e.g. of a screw) so as to give the fingers a good hold.

'Kodachrome ('koudə'kroum) – a ↓subtractive system of colour-photography using three light-sensitive films: (1) blue sensitive; (2) green –; (3) red –; celluloid base. The special characteristic is that the colour-forming substances are in the developers, not in the film as in Agfacolour: (trade names).

'Kollsman ba'rometer ('kɔlzmæn) – very accurate barometer used in telling airmen the exact barometer reading, so as to help them in landing.

/-kon-/ – dust, e.g. **'pneumokoni'osis** ('niuuməkoni'ousis) – disease of the lungs due to dust, (e.g. in coal-mines).

'Koplik's spots ('kɔpliks -) – blue-white marks on the inside of the mouth seen 2 or 3 days before ↓measles appears but while the child is infectious.

'Korsakof's 'syndrome ('kɔɔsəkɔfs 'sindroum) – mental disorder found (e.g.) in cases of poisoning and alcoholism; the sufferer has loss of memory for recent events and loss of power over the limbs.

Kr – chemical sign for ↓krypton.

'kraft paper ('kraaft -) – paper made from *sulphated wood-pulp, used in electrical instruments and making plastic paper boards: *(cooked with calcium bisulphite, $Ca(HSO_3)_2$).

Krebs cycle – a series of chemical changes in the body in which food is broken down and ↓adenosine triphosphate built up. Citric acid plays an important part in the process.

'krilium ('kriliəm) – substance used to improve the condition of poor, clayey soil by breaking it up and allowing a better supply of air and water; there are several kinds – sodium or calcium salts of ↓polymers (e.g. of polyacrylic acid).

'krypton ('kriptɔn) – ↓inert gas, one part in 1 million in the atmosphere; used in some electric lamps.

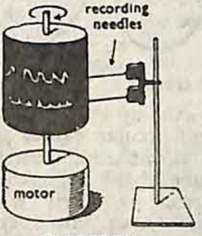
'kupfernickel – ↓niccolite.

Kv – ↓kilovolt.

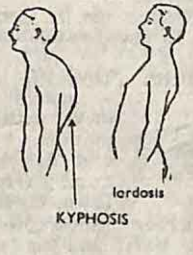
kwashi'orkor ('kwɔʃi'ɔɔkɔɔ) – disease caused by serious lack of proteins in a child's food; (the world's worst problem of nutrition).

'kymograph ('kaimograaf) – revolving drum on which a pen draws a record of (e.g.) breathing, heart beat, etc. on smoked paper.

ky'phosis (kai'fousis) – bending of the spine into an S shape in the front-back direction.



KYMOGRAPH



KYPHOSIS

L

L shell – ↓K shell.

l.c. – lower case = small, not capital letters in printing, a b c *not* A B C.

L.C.M. – lowest common multiple, smallest number which can be divided by two (or more) numbers without remainder, e.g. 48 (not 96 or 192) is the **L.C.M.** of 16 and 12.

L.R.B.M. – long range ballistic missile – ↓missile having a range of about 2,500 miles.

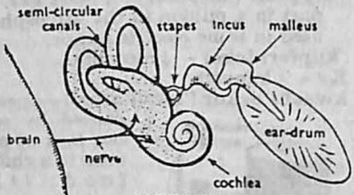
L.T. – low tension (voltage), e.g. a L.T. battery.

'labia ('leibiə) – lips. **'labium** – lip.

'Labi'atae – family of plants in which a flower petal has the shape of a lip, e.g. Dead Nettle, Lavender.

abile substance ('leibail) – (chemistry): not fixed, likely to change or break down.

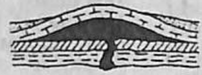
abyrinth ('læbirinθ) – ("complicated building with many passages") : the tubes which make up the inner ear: the three semi-circular canals give sensations of turning and position, the central tube of the cochlea contains the organ of Corti which changes sound-waves into nerve-impulses of hearing.



LABYRINTH

lac – shellac, a resin made by insects in India, used to make varnish and ↓lacquer.

'laccolite, laccolith ('lækolait, -liθ) – mass of rock with a rounded top and flat bottom, formed from melted rock which has been pushed upwards from inside the Earth and has made the higher rock-layers curve and bend.



LACCOLITH

'lace'ration ('læsə'reiʃən) – rough irregular wound, as made by tearing rather than cutting.

'lachrymal 'gland ('lækriməl) – organ at the outside corner of the eye which produces tears.

LACHRYMAL GLAND

'lacquer ('lækə) – (1) varnish, glass-like paint, e.g. on brass, to keep it bright; (2) hard black or coloured surface-covering as on Japanese boxes.

lact-/ (lækt-) – milk: **lac'tation** – the producing of milk. **lact'eals** (læk'tii.əlz) – special ↓lymph vessels which produce a milk-like liquid (lymph with fine drops of fat in it); they carry fat (which has passed through the membrane of the bowel) to the thoracic duct. **'lactic acids** – the acids (e.g.) in sour milk; the more common of the two lactic acids is $CH_3.CH(OH).COOH$. **'lactose**– the kind of sugar (not sweet) found in milk.

la'cuna (læ'kjuunə) – a gap, an empty space or hollow between things.

la'custrine (læ'kʌstrin) – of lakes, e.g. **lacustrine deposits** – rocks formed from material carried (by streams, rivers) into a lake, and dropped on the bottom of the lake.

laevigate – ↓levigate-/.

laevo-/ ('liivo-) – left-hand, e.g. **'laevo-ro'tatory** – twisting ↓polarized light to the left. **'laevulose** ('liivjulous) – fruit sugar; its solution causes polarized light to twist towards the left. ↓dextro-/.

lag – delay; e.g. **ignition lag** – time between firing the petrol vapour in an engine and the rise of gas pressure.

'lagging – covering a pipe or container with cloth (etc.) to keep heat in (or out).

laid paper – paper marked with parallel lines caused by the parallel wires on which the substance was laid when soft.

lakes – dyes produced by a double process: (1) putting the cloth in (e.g.) a metal salt which reacts with the cloth but does not produce colour; and (2) putting the cloth in a dye which, acting with the metal salt, deposits colour in the fibres.

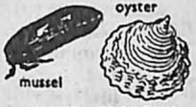
/-'lalia (-'læliə) – speaking, e.g. **'dys'lalia** – speaking in a faulty way, lisping (saying th for s).

La'marckism (læ'maakizm) – the idea that changes in the body caused during the life of an animal or plant can be inherited. (French, 1744–1829.)

'lambert ('læmbət) – unit for measuring the brightness of a surface; the brightness of a surface reflecting 1 ↓lumen per square centimetre. (German, 1728–1777.)

'Lambert pro'jection – A part of the globe is *projected on to a flat surface; the lines of latitude (east-west) are so arranged that the area between any two lines of latitude encloses the same area as that shown on the globe: *(thrown as by a lantern on to a screen).

'lamell-/-i-/ ('læmel-) – thin plate. **'Lamelli'branchia** – shell-fish such as oysters, mussels, cockles, clams, whose breathing organs are made up of thin plates.



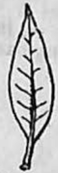
LAMELLIBRANCHIA

'lamina ('læminə) – thin plate; leaf-blade. **'laminar flow** – smooth, steady (not ↓turbulent) flow of air over the surfaces of an aeroplane; so also water over a ship. **'laminated** – made up of thin layers, e.g. **laminated plastics** – plastic material made of layers of (e.g.) paper fixed together with layers of plastic.

'lanate ('leineit) – covered with long hair like a sheep.

LANCET

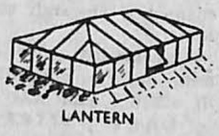
lance (laans) – to cut open as in surgery. **'lancet** ('laansit) – small surgical knife; (shape) e.g. **lancet arch** – sharply pointed arch. **'lanceolate** ('laansioleit) – said of a leaf which has the shape shown in the drawing, i.e. long, pointed, and widest in the middle.


LANCEOLATE

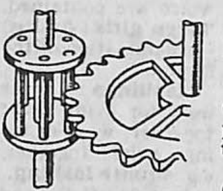
'Langerhans, islets of ('læŋgərænz) – small areas in the ↓pancreas in which *insulin is produced; disease of this area causes *diabetes: *(substance which makes it possible for the body to break down sugar: diabetes – disease in which sugar is found in the urine).

'lanolin ('lænolin) – purified wool-fat, e.g. for use on the skin = ↓moellen.

'lantern ('læntən) – a glass roof built on the top of another roof so as to let in light.

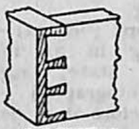

LANTERN

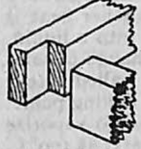
'lantern-wheel, lantern pinion – gear-wheel made of two plates joined by pins through the edges; these pins act as gear teeth.


LANTERN-WHEEL

la'nugo (læ'njuugou) – soft hair of a newly-born animal.

lap, 'overlap – part of one sheet (e.g. of metal) lying over the edge of another. **lap dovetail, lapped joint** – wood-joints as shown. See also lapping.


LAP DOVETAIL


LAPPED JOINT

'lapa'rotomy ('læpə'rɔtəmi) – surgical opening of the *abdomen, e.g. so as to examine the possible cause of disease: *(part of body containing the organs of digestion).

'lapid-/ ('læpid-) – stone, e.g. **'lapidary** – having to do with precious stones; a worker in precious stones.

'lapis ('læpis) – stone. **'lapis 'lazuli** ('læpis-'læzjulai) – rich blue precious stone (not transparent): ↓ultramarine.

lapped – ↓lap.

lapping – polishing by rubbing, e.g. in making lenses.

lapse – falling away, decrease; e.g. **lapse-rate** – speed (rate) of decrease of temperature as one goes higher and higher in the atmosphere.

LARVA (of mosquito)

'larva ('laavə) – first stage (after the egg) in the life of an insect (e.g. fly, moth), e.g. a caterpillar; plural, **larvae**; adj. **larval.**

'laryng-/ ('lærindʒ-) – having to do with the **'larynx** – top 2 inches of the wind- (breath-) pipe in which the organs of voice are contained.

LARYNX

'laryn'gitis (-dʒaitis) – inflammation of the larynx.

'lashings – ropes used for tying poles together; ways of tying poles together, e.g. **square lashing.**

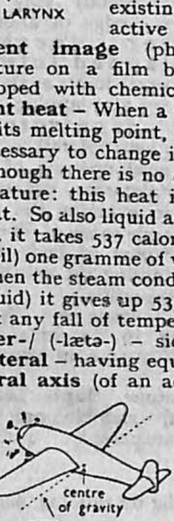
last (laast) – shape of a foot made in wood used in shoemaking.

'latent ('leitənt) – existing in an inactive state; e.g. **latent image** (photography) – picture on a film before it is developed with chemicals.

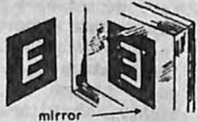
'latent heat – When a solid is already at its melting point, further heat is necessary to change it into a liquid, although there is no change of temperature: this heat is called latent heat. So also liquid at boiling point: e.g. it takes 537 calories to vaporize (boil) one gramme of water at 100° C. When the steam condenses (becomes liquid) it gives up 537 calories without any fall of temperature.

/-later-/ (-lætə-) – side, e.g. **'equi'lateral** – having equal sides.

'lateral axis (of an aeroplane) – the sideways axis (line) parallel to the line joining the ends of the wings, passing through the ↓centre of gravity. **lateral inversion** – said of a picture or image in which the right-hand side appears on the left, and the left-hand side on the right, e.g. the image in a flat mirror. **lateral line** – line along the side (e.g. of a fish).



LATERAL AXIS



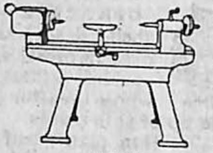
LATERAL INVERSION

'laterite ('lætərait) – form of clay containing iron compounds which give it a brown colour; common in hot damp countries.

'latex ('leiteks) – milk-like liquid in a plant or tree, e.g. that of which rubber is made.

lath (laaθ) – thin long strip of wood, e.g. 1 in. wide, ¼ in. thick. **lath and plaster** – wall or ceiling made of laths covered with plaster.

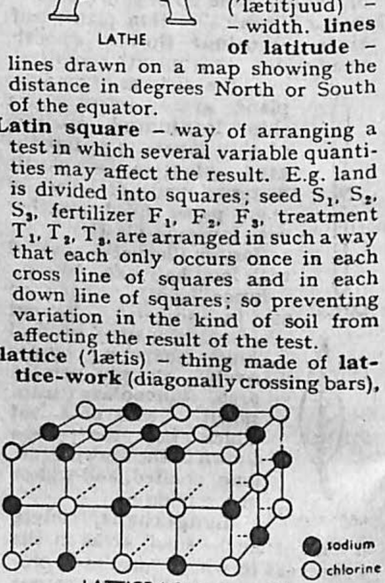
lathe (leið) – machine in which the substance to be worked is turned round and round.


LATHE

lati-/ – wide. **'latitude** ('lætitjuud) – – width. **lines of latitude** – lines drawn on a map showing the distance in degrees North or South of the equator.

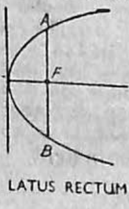
'Latin square – way of arranging a test in which several variable quantities may affect the result. E.g. land is divided into squares; seed S_1, S_2, S_3, fertilizer F_1, F_2, F_3, treatment T_1, T_2, T_3, are arranged in such a way that each only occurs once in each cross line of squares and in each down line of squares; so preventing variation in the kind of soil from affecting the result of the test.

'lattice ('lætis) – thing made of **lattice-work** (diagonally crossing bars), e.g. **lattice girder** – beam made of such bars. **lattice** (crystal-) – arrangement of atoms or ions in a crystal as studied by X-rays.



LATTICE (of common salt)

'latus 'rectum ('leitəs-'rektəm) (of a ↓parabola) – the width *AB* of the parabola measured through the focus *F*.



LATUS RECTUM

'laudanum ('lɔɔdənəm) – solution of opium in alcohol and water.

'Laue pattern ('lauə) – pattern of

black spots on a photographic plate caused by the ↓ diffraction of X-rays when passed through a crystal (von Laue, German, 1879–).

'lava ('laavə) – melted rock from a volcano which solidifies into a sponge-like or glass-like form.

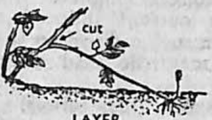
'lavage ('lævidʒ) – washing out, e.g. of the bowel or stomach.

'lavender print ('lævendə) – purple copy of a cinema film used to make another negative, e.g. if the first is lost.

law of (e.g.) Law of Dulong and Petit – ↓ Dulong; Charles' law – ↓ Charles, etc.

lawn (lɔɔn) – fine *plain-woven linen, or similar cloth made of fine cotton: *(under one thread, over one thread).

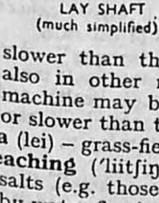
layer ('leiə) – branch of a plant half-cut from the stem and put into the ground so as to grow a new root.



LAYER

'lay-out – plan showing general arrangement of parts.

lay shaft ('lei-ʃaaft) – second axle in a gear-box. The engine shaft (axle) drives the lay shaft; and the lay-shaft drives the car shaft. Different gear wheels (as moved into place) make the lay shaft drive the car-shaft slower than the engine shaft. So also in other machines where the machine may be made to go faster or slower than the engine.



LAY SHAFT (much simplified)

lea (lei) – grass-field. ↓ ley.

'leaching ('liitʃiŋ) – washing out of salts (e.g. those valuable to plants) by water flowing through the soil.

leaded lights ('ledid -) – windows made of small pieces of glass held together by H-shaped strips of lead.

lead glass (led -) – glass containing lead oxide.

leading ('liidiŋ) – front, e.g. **leading edge** – front edge, e.g. of the wing of an aeroplane.

'lead-line ('ledlain) – marked cord used in measuring the depth of the sea from a ship; 20 fathoms long, with **marks** at 2, 3, 5, 7, 10, 13, 15, 17, 20 fathoms. The other measures (at 4, 6, 8, 9, etc.) are called **deeps.**

leaf – thin, flat thing, e.g. part of a table top which can be taken out; part of a folding screen; tooth of a small gear wheel in a watch.

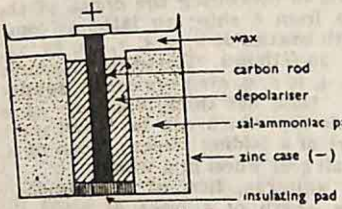
least squares, law of – Example: The length of a piece of wood is measured by five men; their answers are 35, 35, 38, 35 and 37 inches. What is the most probable ("best") length of the piece? The ordinary average is 36 inches. The deviations (differences of each measurement from the average) are 1, 1, 2, 1, 1. The squares of the differences are 1, 1, 4, 1, 1. The sum of the squares is 8. The law says that the most probable length is the length such that the sum of the squares is smallest. In this case the average (36) shows least squares. In certain calculations the method of least squares is the easiest for finding the most probable result.

least time, law of – ↓ Fermat.

le Cha'telier principle (law) (lə ʃæ'telie -) – Example: Ice can be changed into water and water into ice. We can have a steady mixture of ice and water. If we compress the mixture some ice melts because water takes up less space than ice; if we warm the mixture some ice melts because ice takes in heat as it melts (latent heat). In both cases a change takes place so as to undo the effect of the compressing or warming. The principle states that, if we have a steady mixture (equilibrium) of substances and we make a change in the conditions (e.g. pressure, temperature), changes will take place within the mixture so as to undo the effect of that change.

'lecithin ('lesiθin) – 'yolk, yellow part of egg': substance found in plant and animal cells, e.g. 10% in egg-yolk; 2% in blood, and (much) in the nerves and brain: it is composed of fat, phosphoric acid and ↓ choline.

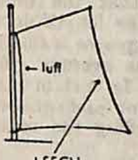
Le'clanché cell (lə'klɔnʃe -) – carbon, zinc, ammonium-chloride electric cell, as sometimes used for electric bells. The ↓ dry form is used in torches and bicycle lamps.



LECLANCHÉ CELL (DRY)

'ledger ('ledʒə) – account book: cross bar, e.g. in scaffolding (frame-work, put up when building, on which the workers stand).

leech – back edge of a sail further from the mast.



LEECH

lee side – opposite side of a ship to that from which the wind is blowing. **leeway** – sideways movement of a ship caused by the wind (or current of water).

left-hand rule – ↓ Fleming's.

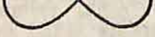
legend line ('ledʒənd) – line of print telling the subject or meaning of a picture or diagram.

'legume ('legjum) – pod (seed-case) of a **le'guminous** (pea and bean family) plant.

lehr, leer, lear ('liiə) – long, pipe-like furnace through which glass passes so as to cool very slowly and so become annealed (free from pushing-pulling forces in the solid state).

'leishma'niasis ('laiʃmə'naiəsis) – diseases caused by the parasite *Leish'mania dono'vani*, e.g. ↓ Kala-azar and Oriental sore.

'lemniscate ('lemniskeit) – curve like the figure 8.



LEMNISCATE

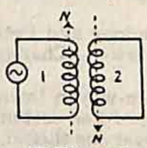
'lenitive ('lenitiv) – very gentle, softening (medicine), e.g. olive oil (but not castor oil).

lens (lenz) – piece of glass or crystal with one or both sides curved so that it is thicker (or thinner) in the middle than at the edge, as in eye-glasses, camera, microscope, telescope, etc.

'lenticel ('lentisel) – very small breathing hole through the cork covering of a stem or root.

'lenticle ('lentikl) – thing shaped like a lens; **len'ticular** – shaped like a lens, slightly curved outwards on both sides.

Lenz's law (lents-) – An ↓ induced current flows in such a direction that it tends to prevent the magnetic field (which causes it) from changing; e.g. if the current in circuit (1) is increasing and making a stronger magnetic field upwards, the current induced in circuit (2) is in such a direction that it makes a magnetic field downwards.



LENZ'S LAW

leon'tiasis ossea (liiɔn'taiəsis) – lion-like appearance due to overgrowth of bone.

'lepido-/ ('lepido-) – scale (plate-like covering, e.g. of a fish, or insect). **Lepi'doptera** (-'dɔp-) – insects such as butterflies and moths which have scale-covered wings.

'leprosy ('leprəsi) – bacterial disease of the skin and nerves in hot countries, especially in the East. It causes white marks on the skin followed by loss of feeling and muscular power, and loss of the part due to failure of nerve supply. Another kind of leprosy causes irregular thickenings of the skin.

/-leptic (-'leptik) – "seizing": e.g. **'ana'leptic** ("up-seizing") – (a medicine) which gives back health and strength, a "pick-me-up." **'cata-'leptic** – adj. of ↓ catalepsy, e.g. a cataleptic trance.

'lepto-/ ('lepto-) – fine, small, thin, e.g. **leptodermatous** (-'dəəmətəs) – having a thin skin.

'lepto'kurtic – First see Normal distribution. The curve of a leptokurtic distribution is thinner and taller than that of a normal distribution, i.e. the measures are more crowded towards the average.

'lesion ('liiʒən) – place in the body wounded or damaged by disease.

le'thargic (le'θaadʒik) – slow in thought and movement. ↓ encephalitis.

'leucine ('ljuusiiu) – an ↓ essential amino-acid.

'leuco-/ ('ljuko-) – white, colourless, e.g. **leuco-compounds** – colourless compounds formed by the reduction (de-oxidizing) of dyes.

'leucocyte – white blood-cell: they destroy bacteria entering the body: ↓ leucotaxine.

'leucocy'thaemia ('ljukousai'θiimiə). **leu'kaemia** – disease in which there is long-lasting excess of white cells in the blood and changes in the marrow (centre part) of the bones; cause unknown.

'leuco'derma (-'dəəmə) – disease in which white areas appear on the skin.

'leuco'penia (-piiniə) – lack of white cells in the blood.

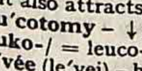
'leuco'taxine (-'tæksiin) – substance produced by the breakdown of protein in a wound: it causes the walls of the capillaries (small blood vessels) to allow leucocytes to pass through: it also attracts the leucocytes.

leu'cotomy – ↓ prefrontal.

leuko-/ = leuco-/.

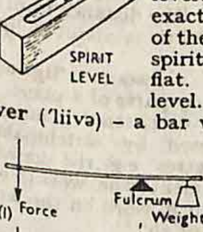
le'vée (le'vei) – high bank built to keep a river in its proper course.

'level (levəl) – e.g. **spirit level** – instrument for showing when a surface is level: the bubble lies exactly in the centre of the tube when the spirit level is lying flat. ↓ hydrostatic level.



SPIRIT LEVEL

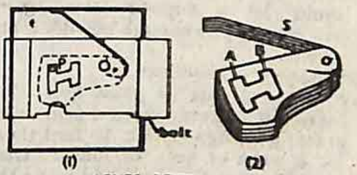
'lever ('liivə) – a bar which can turn about one point so that, when a force acts at one place, another force is produced at another place.



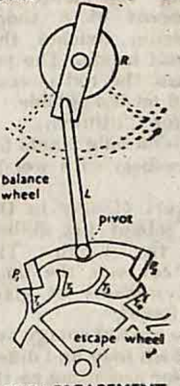
LEVER

law of lever – when a lever is balanced, the ↓ moment of the force(s) trying to turn it clockwise is equal to the moment of the force(s) trying to turn it anti-clockwise, e.g. (drawing 2) $F \times a = W \times b$.

lever lock – The levers (drawing 2, shown dotted in drawing 1) are plates which lie flat against the bolt. They can turn about *C*. The pillar *P* on the bolt passes through the slot *AB* in the levers. The spring *S* pushes the levers down so that *P* is held in the end *A* and the bolt cannot move. The turning of the key tries to move the bolt. If it is the correct key it pushes up each lever to exactly the right position so that *P* can slide along to *B* and thus the bolt can be moved.



LEVER LOCK



LEVER ESCAPEMENT

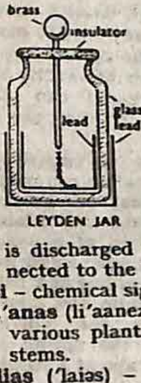
lever watch, lever es'capement (es'keipmənt) – First see Escapement. The balance wheel of a watch swings to and fro, so acting as a pendulum and allowing the energy of the spring to escape at a steady speed. In the diagram *T*ooth 1 of the escape wheel (driven by the main-spring) is just going to press *P*allet 1 up and pass under it. This will move the *L*ever towards the right. The lever turns the *R*oller towards the right and this tightens the balance spring (not shown), and makes the balance wheel swing. At the same time P_2 is coming down to catch $Tooth_3$. The back-swing of the balance wheel will lift P_2. The same process will be repeated every one-fifth of a second.

'levigate ('levigeit) – grind a substance to a fine powder in water; then let the larger pieces settle down (be deposited). Pour off the liquid; let a deposit form again, etc., until a fine enough powder is obtained.

'levulose – ↓ laevulose.

ley (lei) – = lea = grass field. **ley farming** – sowing certain fields with grass; putting cattle in to feed there for a year or two, or longer; then ploughing up the grass and using the fields for grain and other crops; then sowing grass again. The special point is that grass is sown as a crop.

'Leyden jar ('leidən) – form of condenser for storing electricity. The lower part of the jar, inside and outside, is covered with thin metal (e.g. lead). The brass rod passes through an insulating cap and, by means of a short chain, touches the lead inside. The jar is discharged when the rod is connected to the lead on the outside.



LEYDEN JAR

Li – chemical sign for ↓ lithium.

li'anas (li'aanəz) – climbing plants (of various plant families) with woody stems.

'lias ('laiəs) – layers of clay in the Jurassic system (about 145 million years ago) of the Earth. The Jurassic system contains the limestone in which remains of giant lizards, etc., are found.

li'bido (li'biidou) – mental energy and driving-power which may find different kinds of outlet according to the age and mental development of the person. Mental disorder is often caused by a failure to grow up, so that the libido of a grown person is still trying to find its outlet in a childish way. ↓ Freud.

li'bration (lai'breiʃən) (of the moon) – a slight turning of the moon from side to side so that, in the course of time, we see a little more than half of its surface.

lice (lais) – plural of ↓ louse.

'lichens ('laikənz) – small grey, yellow, or blue-green plants growing flat on the surface of (e.g.) stone. A lichen consists of an alga and a fungus growing together in union.

LICHEN

'lien-/-o-/ ('laien-) – having to do with the ↓ spleen, e.g. **lieno-gastric.**

lift – force which causes an aeroplane to go up and stay up.

'ligaments ('ligəmənts) – bundles of strong fibres joining parts of the body together, e.g. bone joining on to bone.

LIGAMENT (of thigh bone)

'ligate ('laigeit) – tie with a **ligature** ('ligətjuə) = thread of silk or other material used to tie up a blood vessel in surgery.

light (building) – a window.

light alloys – alloys of aluminium.

'lighter – large flat-bottomed boat used to take goods off a ship.

light-year – the distance travelled by light in one year – about six million million miles. The distance from the sun to the Earth is about 8 light-minutes.

lign-/ (lign-) – wood. **'ligneous tissue** – woody parts of a plant.

'ligne ('liinjə) – written ‴; measure (formerly) used by watchmakers, 2·256 millimetres; e.g. the diameter of the movement (the works) of a small watch (e.g. worn on the wrist) is about 8‴ or 10‴.

'lignin ('lignin) – complicated substance which can be dissolved out of wood of which it is about 25%.

'lignite ('lignait) – fossilized wood, brown coal.

'ligroin ('ligroin) – the part of petroleum oil which boils between 90° C. and 120° C.

limb of the moon (or **sun**) – the round edge (rim) of the moon as seen from the Earth; so also of the sun.

'limbus – edge, line where two parts of the body join, e.g. the limbus of the ↓ conjunctiva (in the eye), where the edge of the conjunctiva comes over the cornea (transparent front of the eye).

lime (laim) – white powder used e.g. to improve the soil, and in the making of mortar for building. **quick lime** – calcium oxide, CaO, with water forms **slaked lime,** calcium hydroxide $Ca(OH)_2$.

'limestone – rock formed from calcium carbonate deposits on the sea-bed.

lime-water – lime dissolved in distilled (chemically pure) water: if carbon dioxide is blown into it, the calcium forms an insoluble compound (calcium carbonate) and the lime-water looks like milk.

'liminal (**sensation**) ('liminəl) – (sensation) which can only *just* be seen (felt, heard, etc.). ↓ subliminal.

'limit – furthest point or edge. **'limit gauges** (-'geidʒiz) – instruments used for measuring in metal-working so as to get exact sizes. Two measures are used; the rod (etc.) just passes through one measure and just fails to pass through the other.

limiting friction – ↓ friction.

limiting value – Example: A container has 2 feet of water in it: $\frac{1}{2}$ of the water runs out in the first hour: $\frac{1}{2}$ of what is left runs out in each hour after that. The amount of water lost hour by hour is $1 + \frac{1}{2} + (\frac{1}{2} \text{ of } \frac{1}{2}) + (\frac{1}{2} \text{ of } \frac{1}{2} \text{ of } \frac{1}{2})$ etc., etc. If you add up this series (however long you make it) it will never add up to 2. But, as the number of hours grows greater and greater, the measure of water gets nearer and nearer 2: so 2 is (here) the limiting value.

'limno-/ ('limno-) – fresh-water, e.g. **'limnobi'otic** – living in fresh-water.

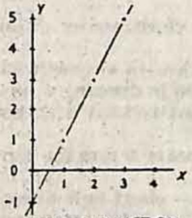
'limonite ('laimənait) – yellow iron ore produced by the breakdown of the black or red iron ore (magnetite, haematite); often found in wet places.

'linch-pin ('linʃ-pin) – pin which prevents a wheel (e.g. of a cart) from falling off the axle.

'linctus ('liŋktəs) – thick liquid medicine, e.g. for a cough.

'linea ('liniə) – line, e.g. **'linea 'alba** (-'ælbə) – central strip of tendons joining the muscles of the two sides of the wall of the abdomen. **'linea 'nigra** (-'naigrə) – similar dark line in woman in child-bearing.

'linear ('liniə) – in a line, lengthwise, e.g. **linear expansion** – increase in length caused by heat. **linear function** – (function = relation between two quantities). The function is linear if its graph is a straight line; such a relation only brings in the quantities x and y, and not, e.g. x^2, or y^2, $\frac{1}{x}$ or other arrangements. Example: $y = 2x - 1$.



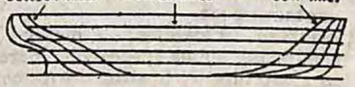
LINEAR FUNCTION

$x = 0 \quad x = 1 \quad x = 2 \quad x = 3$

$y = -1 \quad y = 1 \quad y = 3 \quad y = 5$

line-block = ↓ zinco.

lines of a ship – (1) lines on the plan of a ship showing its shape; (2) the shape of a ship, e.g. "has fine lines" = is narrow.



LINES (of ship)

lines of induction – lines used to describe the strength of a magnetic or electric field. ↓ flux, induction. **lines of force** – ↓ force.

line spectrum – spectrum consisting of clear, separated lines of colours (not a continuous spectrum); caused by atoms in a hot gas or vapour which is giving out light.

'lingua ('liŋwə) – tongue. **'lingual,** adj.

'liniment ('linimənt) – liquid to be rubbed on the body to ease muscular pains, etc.

link – measure used in map-making = 1/100th of chain = 7·92 inches.

'linkage ('liŋkidʒ) – (chemistry): chemical bond; force holding any two atoms together in a molecule.

linked characters – characters which are inherited together, e.g. colour blindness is linked with male sex: also feather-colour in certain poultry.

'linking (-up) – joining parts of an engine so that they work together, e.g. the piston and the wheel.

'Linotype ('lainətaip) – machine which makes lines of printer's type all in one piece ready for use: (trade name).

'linsey ('linzi) – cloth woven of linen and wool.

lint – cotton cloth with very soft hairs on one side, used in dressing wounds. **boric lint** – lint treated with boric acid.

lintel ('lintl) – beam across the top of a doorway.

'linters ('lintəz) – short stiff fibres of cotton which stick to the cotton seed, useless for thread, but used in making plastics, etc.

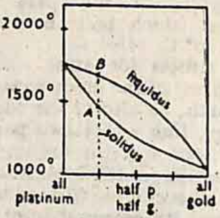
lip-/ (lip-) – fat. **li'pase** – ↓ /-ase. **simple 'lipides** ('lipaidz) – fats, e.g. in the human body.

'lipoids ('lipɔidz) – old name for ↓ sterols (heavy alcohols found, e.g., in many animal and vegetable fats).

li'poma (li'poumə) – diseased growth containing fat.

li'quation (li'kweiʃən) – method of separating solids (especially metals) in a mixture by heating until one of the parts melts and can be run away.

'liquidus ('likwidəs) – Pure platinum melts at 1,755° C., and pure gold at 1,062° C. A mixture of these metals *begins* to melt at a temperature between these two and *finishes* melting at another (higher) temperature between these two. The graph which shows the temperatures at which melting *finishes*, according to the amounts of the metals in the mixture, is called the **liquidus curve.** The curve showing the temperature at which melting *begins* is called the **solidus** curve. Thus a mixture ¼ gold and ¾ platinum begins to melt at about 1,450° C. (point *A*) and finishes melting at about 1,700° C. (point *B*). For mixtures of other substances the liquidus and solidus are much closer, and, in other cases, e.g. silver and gold, may be almost the same.

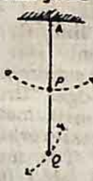


LIQUIDUS CURVE

'liquor 'amnii ('likwɔɔ 'æmniəi) – the liquid inside the amnium (membrane surrounding the child before birth).

lisle thread (lail -) – cotton thread made of long fibres tightly twisted and passed through a flame to burn off outstanding fibres so as to make it smooth.

'Lissa'jous figures ('lisə'dʒuus) – *AP* is a pendulum which swings sideways as shown. *PQ* is a second pendulum hanging from the first; it is made to swing in and out at right-angles to the first pendulum. If both pendulums are swinging, *Q* moves over a curve. Such curves, marked out by a Body which has two swinging movements at right-angles, are called Lissajous figures. Simple curves (when the two times of swings are simply related, e.g. one twice the other) are important in the study of vibrating objects which make sounds.



LISSAJOUS

list – side-edge of woollen cloth.

lith-/- (liθ-) – stone, e.g. **li'thography** – way of printing pictures; the picture is drawn with oily ink on a smooth limestone; the stone is wetted; ink holds to the oily (but not the wet) parts.

'litharge ('liθaadʒ) – lead monoxide (PbO) used to make paint and cement.

/-lithic (liθik) – "of stone": e.g. **'Palaeo'lithic** ("old-stone") period – the period in which the oldest stone tools were made by men, about

50–35 thousand years ago; Later Palaeolithic – 35–15 thousand years ago – period in which better tools were made. **'Neolithic** period – period in which the best, polished tools were made, also pottery, about 10,000 years ago.

'lithium ('liθiəm) – the lightest metal element. **'lithia** – lithium monoxide.

'lithopone ('liθopoun) – 70% barium sulphate + 30% zinc sulphide, used to make white paint and add weight and volume to paper and floor-covering.

'lithosphere – the crust (outer rocks) of the Earth.

li'thotomy (li'θɔtəmi) – cutting out a stone-in-the-bladder: (bladder = organ in which urine collects: stone = hard mass of urates, oxalates or phosphates).

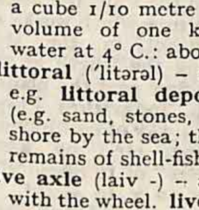
'litmus ('litməs) – dye obtained from a ↓ lichen; it turns red with an acid, blue with an alkali.

'litre ('liitə) – the amount of liquid in a cube 1/10 metre along each edge; volume of one kilogram of pure water at 4° C.: about 1¾ pints.

'littoral ('litərəl) – of the sea shore, e.g. **littoral deposits** – material (e.g. sand, stones, etc.) laid on the shore by the sea; they often contain remains of shell-fish.

live axle (laiv -) – axle which turns with the wheel. **live load** – a moving or varying ↓ load, e.g. that due to traffic passing over a bridge. **live plaster** – plaster which moves when you press it, showing that it is not holding on to the wall. **live rail, live wire** – . . . which is carrying electricity.

'liver of 'sulphur ('livə) – a liver-brown mass formed by heating together potassium carbonate and sulphur.



LIVERWORT

'Liverworts ('livəwəəts) – small flat plants, similar to mosses, but without leaves and branches; found in damp places, e.g. on clay banks, stones by a spring, etc.

'lixivi'ation ('liksivi'eiʃən) – washing out (with water or acid) a soluble substance from a mixture, e.g. metal compound from metal ore, salts from soil (= leaching). The substance so washed out is a **lye** (lai).

load (loud) – the force (e.g. weight) affecting a part; e.g. the weight supported by a pillar of a bridge, the forces acting on a wing of an aeroplane when flying. **ultimate load** – load which causes a thing to break.

load (electric) – the electric power carried by a circuit; the power provided by an electric machine, generator or group of generators. **base load** – that part of the load which is supplied 24 hrs. a day by the most efficient power-stations. **load-shedding** – shutting off certain electric supply wires at times when users are trying to use more electricity than can be supplied.

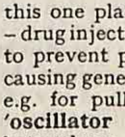
loading (cloth) – glue, metal salts, etc., added to cloth to improve appearance and increase weight.

load line – line on a ship, or in the plan of a ship, showing where the water should come to when the ship is fully loaded (in fresh water, in salt water).

loam (loum) – soil with sand and 8 to 15% clay in it.

'lobar pneu'monia ('loubə nju-'mouniə) – sudden form of pneumonia (infection of the lungs) in adults affecting one lobe.

lobe (loub) – rounded and flattened outstanding part of an organ of the body. **'lobule** ('lɔbjul) – a small lobe.

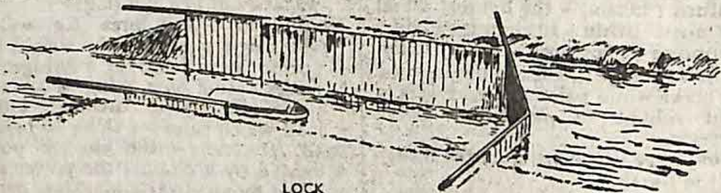


LOBE (of ear)

lo'bectomy (lə'bektəmi) – removal by surgery of a lobe of a lung.

'local ('loukl) – in this one place. **local 'anaes'thetic** – drug injected (or substance applied) to prevent pain in one area without causing general loss of consciousness, e.g. for pulling out a tooth. **local 'oscillator** – part of a ↓ superheterodyne radio receiver which makes high frequency currents to add to those set up by the radio waves. **local time** – time at a place as worked out from the position of the sun as seen from that place.

lock, canal lock – method of raising boats to a higher level of water in a waterway. The boat goes in at the lower end; the doors are closed; water is let in from the upper level till the lock is full; the upper doors are opened and the boat proceeds. Similarly for lowering.

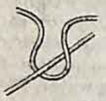


LOCK

'lock-jaw – = ↓tetanus.

'lock-nut – a second nut screwed on to prevent the first nut from loosening.

'lock-stitch – stitch made by a sewing machine; the upper thread is pushed down (or pulled up) through the cloth; the other thread is passed through the loop and the loop is tightened; used also in sewing leather with a hook.



LOCK-STITCH

'loco'mot- / ('loukə'mout-) – ("place – move"): **'loco'motive engine** – engine used for pulling carriages, etc., on a railway. **'loco'motor a'taxia** (- ə'tæksiə) – disease of the nerves of the spinal cord causing loss of power to control and group the actions of muscles, e.g. in walking.

'loculus ('lɔkjuləs) – a small place or space, e.g. in the seed-organ of a plant, plural, **loculi.**

'locus ('loukəs) – a place, a point showing position; (maths.) – the line marked out by a point which moves according to certain rules, e.g. the locus of a point which is always at a fixed distance from another fixed point is a circle; the locus of a point on the edge of a rolling wheel is a ↓cycloid.

lode (loud) – layer of metal-bearing rock in a mine. **lodestone** – magnetic stone.

'loess ('loues) – rock formed from rock dust which has been carried by the wind (from a dry land) and dropped; common in parts of Asia, e.g. China.

log (lɔg) – instrument for measuring the speed of a ship, e.g. piece of wood on the end of a light rope thrown into the sea; the amount of rope pulled out from the ship in a certain time is noted. The **Patent log** is an instrument with blades, pulled behind the ship; the blades turn a rope which works an instrument in the ship showing the length of the water-flow past the blades.

PATENT LOG

log, 'logarithm ('lɔgəriθm) – way of multiplying, dividing, etc., by using "powers" of 10 (usually).

$100 = 10 \times 10 = 10^2$;

so $\log 100 = 2$

$1{,}000 = 10 \times 10 \times 10 = 10^3$;

so $\log 1{,}000 = 3$.

From a Table of Logarithms we can find, e.g.,

$\log 178 = 2{\cdot}25\ldots$; $\log 317 = 2{\cdot}50\ldots$

To multiply, add logs:– $\log 178 = 2{\cdot}25$

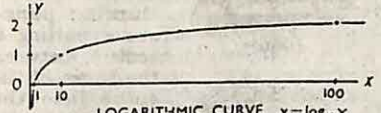
$\log 317 = \underline{2{\cdot}50}$

$4{\cdot}75$

From a Table of Antilogs we find that 4·75... is the log of 56426. So $178 \times 317 = 56426$. To divide, subtract the logs. ↓characteristic. (For Napierian logarithms, ↓e.)

loga'rithmic function – "y is a function of x" means that y depends upon x so that, for every value of x, y has a definite value (or values). In a logarithmic function, y depends upon the logarithm of x, e.g. $y = \log x$. For example, if $x = 1$, $y = \log 1 = 0$;

$x = 10$, $y = \log 10 = 1$. etc. The graph which shows the relation between y and x is called a **loga'rithmic curve.**



LOGARITHMIC CURVE $y = \log_{10} x$

lo'gistic curve (lɔ'dʒistik) – a form of ↓ logarithmic curve, showing growth which increases slowly, then more quickly, then slowly, e.g. number of people in a country, of bacteria in a liquid, etc.

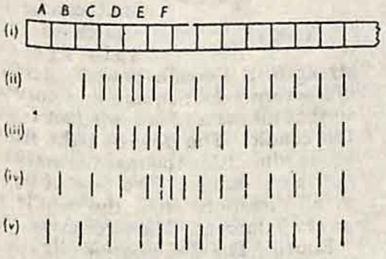
loi'asis – an eye disease caused by a parasitic worm.

loim-/ – plague, infectious disease, e.g. **loimic,** adj. **loimology** – study of such diseases.

'longerons ('lɔŋʒərɔnz) – main, longways bars of the body-frame of an aeroplane.

longi-/ (lɔndʒi-) – long. **'longitude** – lines on a map from pole to pole showing in degrees how far a place is east or west of Greenwich. **longi'tudinal** (line, beam, etc.) – going from end to end, not across.

'longi'tudinal waves – Drawing (i) shows a wooden bar; *ABCDEF* . . . are the particles of which it is made. In (ii) the end has had a sharp blow so that the particles are closer at that end. In (iii), a moment later, the first particles are coming back but further ones are coming closer together. In (iv) and (v), later still, particles further and further along the bar are closer together. Thus a group of close particles travels along the bar. This "**wave**" is caused by particles moving backwards and forwards in the direction of the length of the bar. Sound travels through substances by such longitudinal waves.



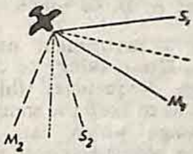
LONGITUDINAL WAVES

long ton – 2,240 lbs.

long waves – radio waves of wavelength over 1,000 metres.

loop-pile (- pail) – surface of a carpet or cloth made by weaving loops and then cutting the loops open.

Lo'ran (lɔ'ræn) – **LO**ng **RA**nge **N**avigation system – a system by which an aeroplane can find out, from signals, exactly where it is. Two stations **Master and Slave,** send out signals; the Slave repeats the Master signal after a fixed delay; from the time between receiving the M and the S signal, the aeroplane can tell when it is exactly the same distance from **M** and **S**. This gives it a line of position. Receiving a second set of **M S** signals from another two stations, the aeroplane gets a cross-line which gives the exact point.



LORAN

lor'dosis (lɔɔ'dousis) – unnatural forward curve of the lower part of the spine. For picture see kyphosis.

Lo'rentz-Fitz'gerald – ↓ Michelson-Morley.

'Lori'cata ('lɔri'keitə) – animals of the Lizard family which have a **lo'rica** (lɔ'raikə) (hard, outer shell), e.g. crocodiles.

LORICATA

lost wax – ↓ cire perdu.

loupe (luup) – small magnifying glass, e.g. for looking at flowers, or at jewels (when they are being cut and polished).

louse (laus) – a parasitic insect; one

LOUSE

kind is found on the body; a second kind in the hair; a third kind in the hair round the reproductive organs. The disease, ↓ typhus is carried by the second kind.

'louver, louvre ('luuvə) – window with sloping strips of wood across it to let in air and keep out light; so also metal plate with movable strips in it, e.g. as part of an aeroplane.

lower case – (printing): small letters, a, b, c, etc., not A, B, C, which are capitals.

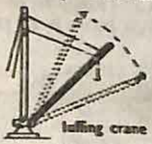
low pass filter – instrument used (e.g. in cinema-film-making) to cut out very high frequencies (high sounds), e.g. so as to keep the sounds within the range which can be recorded on the sound-track of the cinema film.

low tension – low voltage (pressure of electricity), e.g. the 6-volt supply to the filament (negative wire) of a radio valve.

'lubber's line ('lʌbəz -) – line on a ship's or aeroplane's compass drawn parallel to the end-to-end line of the ship or aeroplane.

'lubricate ('luubrikeit) – put oil into parts of an engine to cause easy running.

·luci-/ (lusi-/) – light, e.g. **lu'ciferin, lu'cife'rase** – the light-producing substances of creatures (e.g. glow worms) which shine in the dark.



LUFF

luff (lʌf) – raise or lower the jib (slanting pulley-beam) of a **luffing-crane** = crane whose jib is hinged at the bottom.

LUG-SAIL

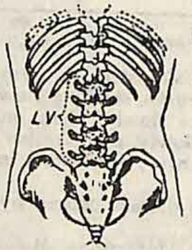
lug (lʌg) – part of a cast or cut metal bar which stands out as an "ear" or button.

lug-sail (lʌgsl) – 4-cornered sail set long-ways, (not across the boat.) **'lugger** ('lʌgə) – boat with a lug-sail.

LUGGER

lum'bago (lʌm'beigou) – muscular pain in the lower part of the back.

lumbar puncture – putting a needle between the bones of the spine into the hole in the centre so as to draw out cerebro-spinal fluid (liquid surrounding the brain and spinal cord).

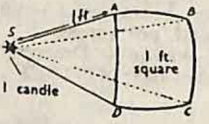


LUMBAR VERTEBRÆ

lumbar regions ('lʌmbə) – lower part of the back. **lumbar vertebrae** – the five big lower bones of the spine, as shown.

'lumen ('luumen) – the space enclosed by cell walls (in parts of the body); a small open space, e.g. the hole in the middle of a tube.

'lumen (unit) – unit for measuring the flow of light from a source (e.g. a lamp) or the flow of light on to a surface. *S* is a unit candle (a source of certain agreed strength, 1 ↓candle-power); *ABCD* is a screen 1 foot square and curved so that all parts of it are 1 foot from the candle. The flow of light from the candle within the space so marked out is one lumen. The flow of light in all directions from the candle is 4π (12·6) lumens. The screen receives 1 lumen. The illumination (lighting up) of the screen is one lumen per square foot. This illumination is the same as a ↓foot-candle. If the candle is one metre distant, the illumination is one **metre candle**. An illumination of 1 lumen per square metre = one **lux**. A 40 watt lamp (ordinary electric reading bulb) gives out about 450 lumens.



LUMEN

'Luminal ('luuminæl) – drug (↓ barbiturate) used to produce sleep and to calm excitement: (trade name).

'lumin'escence – the production of light in a substance without the use of heat, e.g. **chemo-luminescence** – by chemical action, **electro-luminescence** – by an electric field, **cathodo-luminescence** – by ↓ cathode rays. The substance in which the light is produced becomes **luminescent.** ↓fluorescent, phosphorescent.

lumin'osity of a star ('luumin'ɔsiti) – brightness as compared with the sun.

'lunar ('luunə) – having to do with the moon, e.g. a lunar eclipse. **'lunate** – shaped like the crescent moon.

'lupus ('luupəs) – group of skin diseases caused by the ↓tubercle bacillus.

lut-/ (luut-) – yellow, e.g. **'lutein** ('luutii.in) – the yellow colouring matter in the centre part of an egg. ↓corpus luteum.

lux – ↓lumen.

lux'ation (lʌk'seiʃən) – dislocation (putting of a limb out of its joint).

'Lyco'podi'ales ('laiko'poudi 'eiliiz) – the group of plants which includes the ↓club mosses. **'lyco'podium** – yellow powder obtained from a plant (*Lycopodium clavatum*) used to dust on to the skin, also to cover pills of medicine.

lye (lai) – alkaline water obtained by washing vegetable ashes (↓lixiviation); an alkaline solution especially as used for washing or cleaning.

lymph (limf) – (1) colourless liquid in the body; it comes out from the blood, carries food to the tissues and is collected by the lymph vessels which carry it back to the blood. **lymphatics** – lymph vessels. **lymph nodes, lymph glands** – enlarged parts of the lymph vessels; they take out and destroy bacteria and play an important part in preparing ↓antibodies. Also see lacteals, leucocytes, leucotaxine. (2) liquid used in ↓ vaccination.

'lymphaden'oma ('limfæden'oumə) – a diseased growth of the lymph glands.

lyo-/ ('laiou-) – a solution, the liquid of a solution. **'lyo'philic** – (substance) which is readily made into a ↓colloidal solution; it becomes a jelly when water is taken away, remakes a solution when water is added again; e.g. starch. **'lyo-'phobic** – (substance) which does not readily make a colloidal solution; the solid is easily deposited from the solution (e.g. by salts) and it does not remake a solution when water is added again; e.g. gold, certain sulphides.

'lysis ('laisis), **/-lysis** – "a loosening", a breaking-down, e.g. of living cells, of bacteria, of chemical substances (as in ↓electrolysis, ↓hydrolysis, etc.); a lessening of fever or illness.

'Lysol ('laisɔl) – trade name of a disinfectant made from ↓cresol and soap.

/-lytic (-litik) – causing a break-down (e.g. of cells, of chemical substances, etc.), e.g. **'pyro'lytic** – causing chemical decomposition by means of heat.

M

m – ↓meso-/, meta-/ (chemistry).

M – mega-/ (one million).

μ – Greek letter Mu. (1) ↓micro-/; (2) ↓micron.

M.K.S. system – electrical units based on the metre, kilogram and second.

m.p. – melting point.

M-shell – ↓K-shell.

'macerate ('mæsəreit) – soften a solid, e.g. part of a plant or animal, by soaking in water or caustic potash.

Mach number (maak -) – figure showing the relation between the speed of an air-flow, or the speed of an object (e.g. an aeroplane), and the speed of sound. The number 1 shows that the speeds are equal; a number less than (more than) 1 shows that the speed is less than (more than) the speed of sound.

'macro-/ ('mækro-) – big, e.g. **'macro-'cephalic** – having a big head; **'macro'molecule** – very large molecule, e.g. of a diamond, of a ↓polymer.

'macro'cytes ('mækro'saits) – large red blood cells as found when there is failure to form blood cells properly.

macro'phages (/-feidʒiz) – large white cells present in most parts of the body, especially the skin, which destroy bacteria.

'macro'scopic (/-'skɔpik) – as seen *without* a microscope.

'macula, /-ae ('mækjulə) – small coloured spot(s) in the skin (not raised or swollen). **'macula 'lutea** (- 'luutiə) – yellow spot, area of clearest sight on the retina (nerve-endings at back of eye): for picture see Yellow.

'madder – large family of plants including the madder plant from which the red madder dye was obtained.

'Magel'lanic clouds ('mæge'lænik -) – two groups of many faint stars seen from south of the equator, which look like separated parts of the ↓Milky Way.

ma'genta (mə'dʒentə) – (1) purple colour: ↓subtractive process; (2) fuchsine, a purple coal-tar dye.

'magma ('mægmə) – melted substances inside the Earth from which rocks (e.g. granite) were formed.

mag'nalium (mæg'neiliəm) – aluminium + 1·75% copper + 1·75 % magnesium; stronger and more easily worked than aluminium.

mag'nesia (mæg'niiziə) – magnesium oxide (MgO): ↓magnesium.

'magnesite ('mægnəsait) – carbonate of magnesium; used for the inside surface of certain kinds of furnaces.

mag'nesium (mæg'niisiəm) – chemical element, light silvery white metal which burns with a white light: used for night-photography; for alloys, ↓magnalium. **magnesium bromide** $MgBr_2$ – used as a source of bromine. **magnesium carbonate, -citrate, -oxide** – used to cure over-acidity of the stomach, and for a very gentle action in the bowels, e.g. for children. **magnesium sulphate** $MgSO_4 . 7H_2O$ – Epsom salts, used as a medicine. Other magnesium salts are used as a dressing or "filler" for cloth and paper, in the manufacture of pottery, and for lining furnaces.

magnetic amplifier – instrument consisting of two coils of wire wound round an iron core. One coil (the control coil) carries direct current; the other carries alternating current. A small change in the current in the control coil changes the magnetization of the core and allows a much bigger (or smaller) current to flow in the other coil (↓choke). Hence a small change in the control-coil current is amplified (made bigger) in the second coil.

mag'netic axis (mæg'netik -) – line through the centres of the two ↓poles of a magnet.

magnetic cycle of the sun – Sunspots mostly appear in pairs; one revolving clockwise, and the other the opposite way. The greatest number of sunspots appears every eleven years, but the directions are opposite. The magnetic cycle is the period of these two lots of sunspots = 23 years.

magnetic mirror – a magnet arranged to reflect electric particles, e.g. in a ↓mirror machine.

magnetic variations – daily and yearly changes in the magnetism of the Earth as shown by its effect on a compass.

'magnetite ('mægnetait) – magnetic iron ore (an iron oxide, Fe_3O_4).

mag'neto (mæg'niitou) – small electric generator with permanent (not electro-) magnets, used (e.g.) to produce the spark which fires the petrol vapour in some motor car engines.

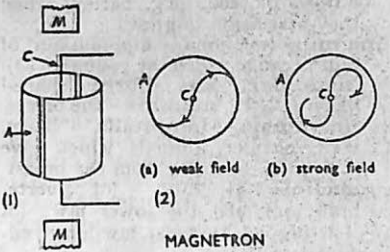
mag'neto-hydrody'namics (mag-'niito-haidrodai'næmiks) – the study of the effects of a magnetic field on a moving fluid (liquid or gas) which is also an electric conductor. Important in the study of stars and of very hot gases.

'magne'tometer – instrument for comparing or measuring strengths of magnets or of magnetic fields.

mag'neto-'striction – the small change in length of a metal (e.g. an iron bar) when it is magnetized. The effect in nickel (a decrease in length) is more than in iron, steel and cobalt.

↓ Ultrasonic vibrations are produced by means of this effect, using a high frequency current.

'magnetron ('mægnitrɔn) – kind of radio valve used for producing high frequency oscillations (swings of current backwards and forwards). It



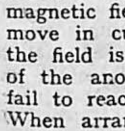
MAGNETRON

consists of a Cathode which sends out the electrons, an Anode (⊕ plate) which receives the electrons, and Magnets which make a magnetic field long-ways in the valve. The anode is usually in two parts. The magnetic field makes the electrons move in curves (see (a)) and, if the field is strong or the voltage of the anode weak, the electrons fail to reach the anode (see (b)). When arranged suitably in a circuit, it forms an ↓ oscillator. Used in ↓ Radar. ↓ cavity-magnetron.

'magnitude (of stars) (mægni'tjud) – brightness of stars as compared with each other. The absolute magnitude is the comparative brightness which the stars *would* have if they were all at the same *distance away from the Earth: *(10 ↓ parsecs).

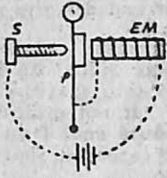
mag'nolia metal (mæg'nouliə -) – lead alloy (78–84%), containing antimony, iron and tin, used for bearings.

ma'jolica (mə'jɔlikə) – pottery decorated with white or coloured glazes.



'majuscule ('mædʒəskjul) – a capital letter – sometimes decorated, as in old books.

make and break – instrument which joins up and breaks an electric circuit, so starting and stopping electric current, as in an electric bell. As



MAKE AND BREAK

soon as the Plate touches the Screw it makes a connection. The Electro-Magnet then pulls the plate back and so breaks the connection. The plate springs back and touches the screw, etc.

making good – mending plaster and woodwork after doing work such as reconstructing part of a building.

mal (mæl) – illness, e.g. **'mal-de-'mer** (də'meə) – sea-sickness. **'petit mal** ('peti -) – a form of ↓ epilepsy in which there is loss of consciousness but no muscular spasms (tightening, etc., of the muscles).

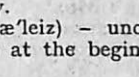
'malachite ('mæləkait) – green stone (copper carbonate) used for decoration; also a copper ore. **malachite green** – a green dye (↓ triphenylmethane dye).

/-ma'lacia (-mæ'leiʃiə) – softening, e.g. **'osteoma'lacia** – softening of the bones, e.g. due to lack of ↓ vitamins and sunshine, especially in child-bearing owing to extra need of calcium (lime) for the bones of the child's body.

ma'laise (mæ'leiz) – uncomfortable feelings, as at the beginning of an illness.

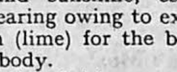
'malar ('meilə) – having to do with the cheek.

ma'leic an'hydride (mə'lei.ik æn'haidraid) – substance used in the manufacture of plastics; also to keep fats and oils from going bad:



$$\begin{array}{l} CH.CO \searrow \\ \| \qquad\qquad O \\ CH.CO \nearrow \end{array}$$

'malic acid ('mælik) – ("of apples"): the acid of apples and many other fruits:



$$\begin{array}{l} CH_2.COOH \\ | \\ CH(OH).COOH \end{array}$$

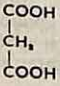
ma'lignant growth (mə'lignənt) – A benignant (harmless) growth, e.g. a wart (dark raised growth in the skin), pushes the surrounding tissue aside. A malignant growth (e.g. cancer) grows into the surrounding tissue, spreads through it and destroys it: for picture see cancer.

'malleable metal ('mæliəbl) – (*malleus* = hammer): metal which can be beaten or pressed into shape, e.g. copper and lead, but not ordinary cast iron. **malleable cast iron** – cast iron with less carbon so that it becomes malleable.

ma'lleolus (mæ'liioləs) – hammer-shaped bone, e.g. the ankle bones.

'malleus ('mæliəs) – ("hammer"): small hammer-shaped bone in the ear; for picture see Incus.

ma'lonic acid (mæl'ɔnik) – acid found in sugar-beet. The ester (acid + alcohol) + urea → barbituric acid from which many important sleep-producing drugs (barbiturates) are made, e.g. allonal, luminal, medinal: (trade names).



$$COOH-CH_2-COOH$$

mal'pighian bodies (mæl'pigiən) – small Bodies (about 0·2 millimetre) in the kidney in which the purification of the blood takes place. (Italian, 1628–94.)

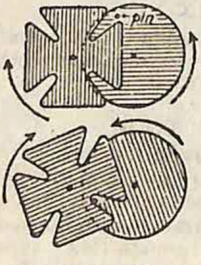
malpighian layer – the softer layer of the epidermis (outer skin) just below the hard outermost horny layer.

'malpresen'tation ('mælpriizən'teiʃən) – appearance at the opening of the uterus (organ of child-birth) of some part of the body of the child other than the head, e.g. a foot or the face.

'Malta fever ('mɔltə -) – also called Undulant Fever; it continues, on and off, for a long time, and is caused by milk infected with the organism *Brucella Melitensis* (*Melitensis* = of Malta); also by *Brucella Abortus*: (contagious ↓ abortion).

'maltase ('mɔlteis) – ↓ enzyme affecting the break-down of malt-sugar.

Mal'tese cross (mɔl'tiiz -) – instrument used to change a circular movement into a number of short down movements, as in a machine for showing cinema films: as the circle turns, the pin goes in and out of each of the four cuts in the cross, so producing a quick jump forward of one picture.



MALTESE CROSS

'maltose ('mɔltous) – the sugar formed in seeds (e.g. barley) when they first begin to grow.

ma'milla (mæ'milə) – nipple (point of milk organ at which the young sucks). **'mamillar, /-ate, /-iform** – shaped like a breast. **'mamma** – the breast. **'mammals, Mam'malia** – hairy, warm-blooded animals which give milk to their young from the breast.

'mandible ('mændibl) – (of ↓ vertebrate animals) the lower jaw; (of ↓ arthropod animals) jaw-like feeding-parts.

'mandrel, 'mandril ('mændrəl) – (1) bar larger at one end which is put through the centre of a (e.g.) wheel to hold it in a lathe while the edge and sides are being cut; (2) centre-piece round which metal tubes are rolled or drawn; (3) round wooden bar used for straightening pipes.

'manganates ('mæŋgəneits) – salts of **man'ganic acid** (H_2MnO_4), e.g. sodium manganate (Na_2MnO_4) used in green Condy's fluid, antiseptic and disinfectant. **permanganates** – salts of permanganic acid ($HMnO_4$), e.g. potassium permanganate ($KMnO_4$): Condy's fluid (a red disinfectant) is a solution of sodium and calcium permanganates.

'manga'nese ('mæŋgə'niiz) – white metal element, brittle (easily broken) when pure. Iron-manganese alloy is used in the making of steel (↓ Bessemer process) for getting out the oxygen and sulphur; manganese oxides are used to colour glass, pottery, paint, etc. **manganese steel** – steel containing 11–14% manganese; resists wear; used for railway-line crossings. **manganese bronze** – alloy of copper and zinc and manganese.

'manganin ('mæŋgənin) – copper alloy containing 13–17% manganese, used for making electrical resistance wire.

mange (meindʒ) – skin-disease of animals caused by an ↓acarus (very small spider-like parasite).

'manhole – hole with iron cover (**man-lid**) through which a man may go, e.g. into underground drains.

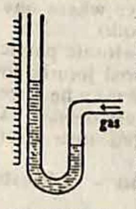
'mania ('meiniə) – excited state of disorder of the mind. **'manic-de'pressive insanity** (mænic-) – disorder of the mind which results in states of great excitement followed by states of despair.

'manifold ('mænifould) – many, of different kinds. **exhaust manifold** – outlet for gases of an engine, made of many small pipes from different cylinders leading into one big pipe. So also **intake 'manifold** – one large pipe from which small pipes lead off petrol-air mixture into various cylinders.

ma'nilla paper (mə'nilə -) – cartridge paper – very strong paper with wax or varnish on it.

'Mannesmann tube ('mænezmæn -) – metal pipe with no join along the side, made by forcing a bar of metal over a central ↓mandrel (bar): trade name.

'mannitol ('mænitɔl) – a crystalline alcohol containing six hydroxyl (OH) groups, found in many plants, e.g. larch, celery, sugar cane, and especially in the Manna ash (Fraxinus ornus) the dried juice of which formed the food "manna" (as in the Bible).

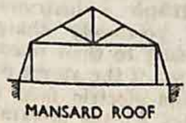


MANOMETER

'mannose ('mænous) – a sugar formed by boiling the seed of a brazil nut, or from ↓mannitol.

ma'nometer (mænɔmitə) – instrument for measuring small pressures of gas. **'mano'metric flame** – flame which vibrates owing to changes in pressure caused by sound waves.

'mansard roof ('mænsaad) – roof with a double slope off each side.



MANSARD ROOF

'Mansbridge electrical condenser – condenser made of rolled up wax paper with a tin coating on each side of the paper; commonly used in telephone and radio.

man'tissa (mæn'tisə) – the figures following the decimal point in a ↓logarithm. ↓characteristic.

'mantle – a soft fold of the body-wall of a shell-fish in which the substance of the shell is produced.

'manual ('mænjuəl) – done by hand, e.g. **manual telephone exchange** (not an automatic telephone exchange); the keys of a musical organ pressed by the fingers.

ma'rasmus (mə'ræzməs) – wasting away (becoming thinner and weaker) in young children.

'marcasite ('maakəsait) – (1) white crystalline iron pyrites (iron disulphide) used in cheap jewelry; (2) steel or white metal cut in the shape of a small jewel.

'mare, 'maria ('mæri, 'mæriə) – ("sea-s") – name given to areas on the Moon's surface which the telescope has since shown to be flat land, not seas.

mare's tail – ↓cirrus cloud.

mari-/ – of the sea. **'marigram** ('mærigræm) – record of the varying height of the tide.

'mari'huana 'maria'huana – ↓hashish.

ma'rine boiler (mə'riin -) – short wide boiler (as in ships) in which heat from the fire passes in tubes through the water.

'Mariotte's law ('mæriɔtz -) – ↓Boyle's law.

marks – ↓lead-line.

marl (maal) – clay or ↓loam with a certain proportion of calcium carbonate (e.g. chalk) in it; certain kinds of marl are used for brickmaking.

'marline ('maalin) – very light rope made of only 2 strings twisted together. **'marling** – binding a rope with marline with a knot at every turn. **'marline spike** ('maalinspaik) – rod about 14 inches long: it has a point at one end and a hole at the other end; used for splicing (weaving rope-ends together to make one rope), unscrewing or screwing up things, etc. – but not in marling.

'marmor-/ – of marble (milky, white stone with grey or coloured lines as used for grave-stones, statues, etc.), e.g. **mar'moreal** (maa'mɔɔriəl) – of or like marble.

'marocain ('mærokein) – fine cotton or silk cloth with a wavy rib (outstanding thread) across it.

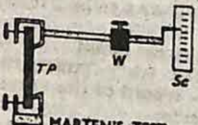
marsh gas – ↓methane.

MARSUPIALS

Marsh's test – way of finding the amount of ↓arsenic present in a certain substance.

mar'supials (maa'sjuupiəlz – animals (e.g. kangaroos) which have a **marsupium** – bag in front in which the young are carried.

'Marten's dis'tortion test ('maaten) – *TP* is the test piece: the *W*eight is moved along the bar, so pressing the *TP* out of shape. The bending is shown on the *S*cale.



MARTEN'S TEST

'martensite ('maatensait) – solid solution of carbon in iron which causes hardness in steel when it is cooled very quickly.

'marver ('maavə) – iron or stone table on which glass is rolled when it is being worked by hand.

'maser ('meisə) – apparatus in which a substance (e.g. a crystal) contains stored radio energy which can be set free by the arrival of a radio signal; thus the signal can be detected and made stronger. (*M*icrowave *A*mplification by *S*timulated *E*mission of *R*adiation.)

'masochism ('mæzəkizm) – mental disorder which takes the form of wishing to suffer pain.

mass – (1) **Inertial mass** – a measure of the inertia of a Body (its resistance to change of motion) as shown by comparing the rates at which the Body and a standard mass (e.g. International Prototype Kilogramme) change their speeds when the same forces are applied. (2) **Gravitational mass** – The force of gravity between two Bodies (e.g. the Earth and a stone) depends upon their gravitational masses multiplied together and their distance apart (↓G).

These two masses of a Body are always the same. Thus, on the Earth, masses can be compared by comparing the forces of gravity on them, i.e. by weighing them, and this gives the same result as comparing their inertial masses. (On the Moon the masses would be unchanged but the actual weights, i.e. the Moon's gravitational forces, would be different from those on the Earth.)

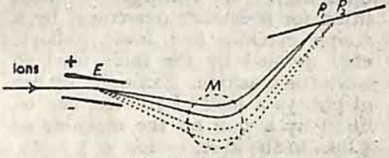
Mass action, law of – The speed of a chemical action between two substances depends on the concentration (how much matter in a certain volume) of the substances. – Example: acid + alcohol → ester + water (↓esterification). The speed of action depends upon the concentration of the acid and the concentration of the alcohol; as they are used up the action gets slower. The law can also be applied to gases, to ions (electrically charged particles) in solutions in certain cases, and, with certain rules, in cases where one of the substances is a solid.

mass defect – When atomic particles (e.g. protons, neutrons) join to form nuclei of atoms there may be a small loss of matter (= mass defect). The lost mass is changed into energy (↓Einstein relation).

mass-energy relation – ↓Einstein relation.

mass ratio (of a rocket) – the original mass (weight) including the fuel, etc., divided by the final mass after the fuel has been used up.

mass 'spectrograph – instrument for separating positively charged particles according to their masses. See diagram: ions of the atoms pass first through the electric field between the plates *E*; the stream is bent downwards. Then a magnetic field *M* (at right angles to the paper) bends the stream upwards. In this way all particles with the same mass come to the same point *P* on a photographic plate. Particles with other masses come to other points. From the dark lines on the plate (called the **mass spectrum**) the masses of the particles can be found.



MASS SPECTROGRAPH

mass-velocity relation – As a Body moves faster its mass increases until, at the speed of light, the mass would be infinitely great (great beyond all measure). ↓relativity.

mast-/ (mæst-) – the breast, e.g. **mas'titis** (mæs'taitis) – inflammation of the breast.

'mastic ('mæstik) – (1) resin used in making varnish: (2) easily moulded substance used to make waterproof joints, e.g. bitumen-preparation (a black, easily melted, tar-like substance); also powdered brick, lead oxide and linseed oil.

'masticate ('mæstikeit) – bite and chew food into a soft mass; break up substances into small pieces in liquid and mix thoroughly as in preparing the paste for manufacturing paper or plastics.

'mastoid ('mæstɔid) – the round outstanding mass of bone just behind the ear. **'mastoi'ditis** – inflammation in the hollow inside part of the mastoid bone.

ma'teria 'medica (mæ'tiiəriə'medikə) – the study of drugs, where obtained, how prepared and used.

'matrix ('meitriks) – place in which a thing is formed or shaped, e.g. printer's type is cast from melted metal in a matrix; the rock in which a jewel is formed is the matrix; the regular arrangement of carbon blocks in a nuclear ↓reactor. **matrices** ('meitrisiiz) – plural. **matrix mechanics, matrices** – a branch of mathematics used for making calculations about the position and speed of very small particles, where exact measures are impossible and one can deal only with probabilities. ↓quantum mechanics.

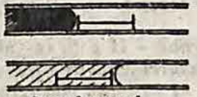
matte (mæt) – solution of mixed sulphides produced in the smelting of sulphide ores (especially copper ores).

matt surface – smooth but not polished surface.

'matu'ration ('mætju'reiʃən) – (of cells) becoming mature (ripe, fully grown).

maul (mɔːl) – (1) a heavy wooden hammer, also called **mall** or **beetle,** used, e.g., for driving a small post into the ground; (2) a 3–4 lb. hand hammer used in shaping hard stone.

ma'xilla (mæk'silə) – jaw; upper jaw in vertebrates (animals with a spine, e.g. horse, dog, man); in insects, etc., a small outgrowth near the mouth used in feeding.



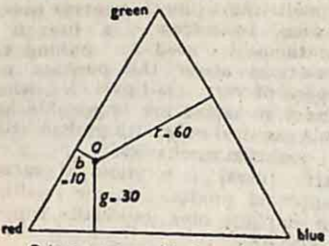
Part of item of MAXIMUM AND MIMIMUM THERMOMETERS

'maximum and 'minimum thermometers – instruments which show the highest or lowest temperature during the 24 hours. In the maximum thermometer mercury pushes a small metal bar up; the bar is left at the highest point reached. In the minimum thermometer alcohol pulls the metal bar down to the lowest point and leaves it there.

'maxwell ('mækswel) – unit of magnetic ↓flux (one line of force per square centimetre).

Maxwell's 'colour triangle – triangle which shows the colours produced by mixtures of coloured lights (not paints). See diagram on next page; the colour *O* = orange; it consists of a mixture of 60% red light, 10% blue light, and 30% green light. These colours (red, green and reddish blue) are **Maxwell's primaries.**

Maxwell's law – (of distribution of velocities): The molecules of a gas



Colour represented by O consists of 10 parts blue, 30 parts green, 60 parts red.
MAXWELL'S TRIANGLE

are always moving about in various directions and their *average* speed depends upon the kind of gas and its temperature. But some molecules have smaller (or greater) speeds than the average. Maxwell's law states mathematically how the velocities (speeds) are distributed (spread out on each side of the average). (Scottish, 1831–1879.)

Mc.p.s. – Megacycle = million complete cycles (changes ⊕ to ⊖ and ⊖ to ⊕ in a radio wave): Mc.p.s. = megacycles per second.

Me – ↓ methyl.

mean square error – If n (a certain number of) measurements of a quantity are $x_1, x_2, x_3 \ldots$ and the mean (average) is y, the mean square error is the square root of

$$\frac{(y - x_1)^2 + (y - x_2)^2 \ldots}{n - 1}$$

Example: the measurements are 1, 5, 7, 9, 13; the average is 7. The deviations $(y - x_1), (y - x_2) \ldots$ are 6, 2, 0, 2, 6. The deviations squared are 36, 4, 0, 4, 36. Sum of deviations squared $\div (n - 1) = 80 \div 4 = 20$. Mean square error $= \sqrt{20} = 4{\cdot}47$.

mean sun – the sun, thought of as going round the Earth at a regular daily rate, so that the **mean solar day** is always the same length.

'measles ('miizlz) = Morbilli: infectious diseases causing running of the nose and eyes, redness of the skin. ↓ Koplik.

measly pork – pig meat with worms in it; these worms are an early stage in the development of the tapeworm.

me'atus (mii'eitəs) – small opening or pathway of an organ, e.g. **auditory meatus** = ear-hole.

me'chanical ad'vantage – load lifted (or resistance overcome) by a simple machine (e.g. lever, pulleys, etc.) divided by the force used to work the machine. Example: by use of pulleys a load of 100 lbs. can be lifted by a pull on the machine of 5 lbs., so the M.A. = 100 ÷ 5 = 20.

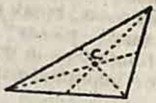
me'chanical e'quivalent of heat – When work is changed into heat (e.g. by pushing something on a rough surface, by stopping a moving thing with a brake, by driving electricity through a wire) a fixed amount of work produces a fixed amount of heat. The mechanical equivalent of heat is the amount of work which produces, or is equal to, one unit of heat. Thus 4·18 ↓ joules of work produce 1 ↓ calorie of heat: 778 ↓ foot-pounds of work produce 1 ↓ B.Th.U. of heat. Each of these figures is a statement of the mechanical equivalent of heat.

me'chanics – the study of the action of forces on Bodies.

me'conium (me'kouniəm) – substance which collects in the bowel of a child before birth.

medi-/-o-/ (medi-) – middle.

'median ('miidiən) – (1) of a triangle – line from a point to the middle of the opposite side: the point (*C*) where the medians cross is the **centroid** or centre of gravity; (2) the middle measure when the measures are arranged according to size, e.g. 1, 3, 6, 7, 11, median = 6; 2, 4, 5, 7, median = 4½.



MEDIANS

'medias'tinum ('miidiə'stainəm) – space between the two lungs in which are the wind- (breath-) pipe, oesophagus (food pipe) and heart.

'Medinal ('medinæl) – form of barbituric acid used to produce quietness and sleep: ↓ malonic acid: (trade name).

'medium – (1) substance in which

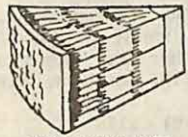
e.g. water is the medium in which a fish lives; linseed oil is the medium in which paint is mixed; oil-paint is the medium with which an artist works; air (water, etc.) is the medium in which light travels; (2) of middle size.

me'dulla (me'dʌlə) – middle, inside part of an organ, e.g. the marrow (= fat) inside a bone; the soft centre-part (pith) of the stem of a plant.

medulla 'oblon'gata (- 'ɔblɔŋ'gaatə) – part of the brain, as shown; it controls breathing, heart-beat and the most necessary actions of the body.

me'dullary rays – lines of cells running outwards from the centre of the trunk or branch of a tree.

MEDULLA OBLONGATA



MEDULLARY RAYS

'medullated nerve fibres – nerve-fibres which have a fatty covering (also called **myelinated**).

me'dusa (me'djuuzə) – (Medusa in a Greek story had hair made of snakes): a jelly-fish; the sex form in the history of certain ↓ coelenterata (e.g. ↓ obelia).

MEDUSA

'mega-/ ('megə-) – (1) large, e.g. **'mega'colon** – enlargement of the colon (part of bowel) so that waste matter does not pass through it in a regular manner. (2) one million, e.g. **megawatt** – one million ↓ watts; **megacycles** – millions of cycles; **'mega'ton** – a measure of the explosive power of nuclear weapons, a power of the same value as a million tons of ↓ trinitrotoluene (T.N.T.).

'megalo-/ ('megəlou-) – large, e.g. **'megalocyte** – large red blood-cell. **'megalo'mania** (-'meinjə) – disorder of the mind in which the sufferer has very grand ideas of himself, e.g. believes that he is king.

/-'megaly (-'megəli) – largeness of . . ., e.g. **'acro'megaly** ('ækro-) – a disease which causes the outer parts of the body (hands, feet, head) to grow very large. ↓ pituitary.

me'gilp (mə'gilp) – mixture of linseed oil and turpentine, mixed with colours in the painting of pictures; it is used to make the paint thinner.

'megohm – one million ↓ ohms.

mei'osis (mai'ousis) – division of the cell in which the number of chromosomes (character-bearing units) is halved: the sex-cells have such a half-set of chromosomes.

'melan-/-o-/ – black, e.g. **'melanin** ('melənin) – substance which produces the dark colour of the hair. **'mela'noma** ('melə'noumə) – a dark coloured diseased growth (cancer) of the skin, usually malignant (growing into and destroying tissue). **'mela'notic** – dark coloured, e.g. **melanotic sarcoma** – a dark coloured cancerous growth in, e.g., muscle or bone.

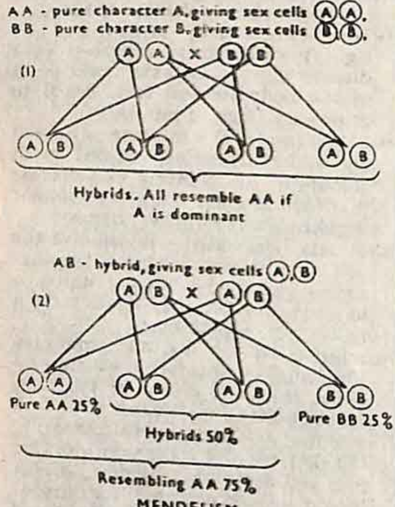
'melting point – the temperature at which a solid becomes liquid.

'membrane ('membrein) – a thin skin, a thin layer of tissue.

'Mende'léef's table ('mendə'lei.efs) – ↓ periodic system. (Russian, 1834–1907.)

Men'delian character, factor (men-'diiliən -) – a character (factor) which is inherited according to the laws of Mendelism (see below).

'Mendelism ('mendəlizm) – The "one-or-other" hereditary factors (e.g. tallness or dwarfness of peas, blue or brown colour of eyes) are carried separately in the sex cells and are not changed by union. An offspring which inherits the same factor (say A) from each parent is "pure" with regard to that factor; he (it) may be represented by AA. If pure AA mates with pure BB, where B is the contrasting factor to A, the offspring must obtain a factor A from one parent and a factor B from the other (diagram 1). He is hybrid and may be represented by AB. If, as is often the case, one


AA - pure character A, giving sex cells A A.
BB - pure character B, giving sex cells B B.
(1)
A A × B B
A B A B A B A B
Hybrids. All resemble AA if A is dominant
AB - hybrid, giving sex cells A, B
(2)
A B × A B
A A A B A B B B
Pure AA 25%
Pure BB 25%
Hybrids 50%
Resembling AA 75%

MENDELISM

factor (e.g. A) is **dominant,** this factor shows in the offspring and so the offspring resembles the parent AA with regard to this factor; the other factor B is **recessive** and does not show (though it is there and may be passed on).

If two hybrids AB mate (diagram 2), their offspring may inherit either A or B from one parent and either A or B from the other parent. This is controlled by the laws of chance. The result is that in a large number of offspring, 25% will inherit A from both parents (and so be pure AA), 25% will inherit B from both parents (and so be pure BB), and 50% will inherit A from one of the parents and B from the other (and so be hybrid AB). Note that if A is dominant, the factor will show in 25% (pure) + 50% (hybrid) = 75% of the offspring.

Meni'ère's disease (meni'eəz) – disease of the inner ear causing headache, deafness, and giddiness (feeling of spinning round).

me'ninges (me'nindʒiiz) – membranes covering the brain and spinal cord. **'menin'gitis** ('menin'dʒaitəs) – inflammation of the meninges.

me'niscus (me'niskəs) – (1) the curved surface of liquid in a tube; (2) curved plate of cartilage (soft, tough material) in a joint between two bones. **meniscus lens** – lens curved outwards on one side, inwards on the other, one curve being greater than the other.

meno-/ – month, e.g. **'menopause** ('menopɔɔz) – age at which the monthly loss of blood in the female ceases – about age 50. **'menor'rhagia** ('meno'reidʒiə) – too great monthly loss of blood in the female. **'menstrual** ('menstruəl) – having to do with the **'menses** ('mensiiz) (monthly bleeding). **'menstru'ation** – the monthly bleeding.

'menthol ('menθɔl) – very strong-smelling white, ice-like substance (↓terpene); rather like camphor. When rubbed on the skin it produces a cold feeling.

'mentum ('mentəm) – chin.

'mepacrine ('mepəkriin) – also called Atebrin (trade names), a compound of ↓acridine, used as a medicine for malaria: it affects all forms of the malarial parasite found in the blood, except the sex-stage of malignant malaria.

/-mer – a part, a unit. **'monomer** ('mɔnoməə) – a unit part, a simple chemical compound whose molecules can be made into **'polymers** ("many parts") i.e. long chains of molecules joined together as in plastics and in rubber: e.g. ↓isoprene is the monomer of natural rubber: rubber is polymerized isoprene. ↓isomers, ↓metameric compounds: see also mero-/.

mer'captans (məə'kæptænz) –

$$\left.\begin{array}{l}\text{ethyl alcohol} - CH_3.CH_2.OH\\ \text{ethyl mercaptan} - CH_3.CH_2.SH\end{array}\right\}$$

Mercaptans are alcohols in which the oxygen atom has been replaced by sulphur. They are bad-smelling substances. Ethyl mercaptan is produced in the bowel by bacteria from proteins; it is found also in petroleum; used in preparing ↓sulphonal, also in quickening the vulcanizing (hardening) of rubber.

Mer'cator's pro'jection (məə'keitəz) – Imagine a lamp at the centre of the Earth showing the shape of the land as a shadow on a cylinder (a tube) wrapped round the Earth. A Mercator projection is based on this idea; lines of latitude (east-west lines) and lines of longitude (north-south lines) are straight and at right-angles to each other, countries further north and south (e.g. England, Iceland, Tasmania) seem larger in proportion than countries near the equator (e.g. India).

'mercerized cotton ('məəsəraizd) – cotton thread treated with caustic soda while pulled tight; this makes it strong and silk-like.

'mercury ('məəkjuri) – heavy metal element which is liquid at ordinary temperatures. Its chemical sign is Hg (Latin, **h**ydrar**g**yrum). Also called quicksilver. Used in the common kinds of thermometers and barometers. It forms solid solutions (amalgams) of most metals. **mercuric chloride,** $HgCl_2$ – corrosive sublimate (poisonous antiseptic). **mercuric sulphide,** HgS – vermilion, red colouring matter, **mercurous chloride,** Hg_2Cl_2 – calomel (medicine for the liver and bowels).

mercury vapour lamp – lamp used to produce ↓ ultra-violet light: it uses a flow of electricity through mercury vapour inside a quartz-glass tube. Used in photography and medical light treatment, e.g. a "Sunlight" lamps

meri-/ – part, unit. **me'ristic variation** (me'ristik -) – variation in the number of parts in an animal or plant, e.g. ring of 3 leaves at a point on a stem when 2 is the usual number.

me'ridian (me'ridiən) – (1) imaginary circle in the sky passing from the north, overhead to the south; (2) imaginary line on the Earth passing through the North Pole, the South Pole and round again to the North Pole: ↓ longitude.

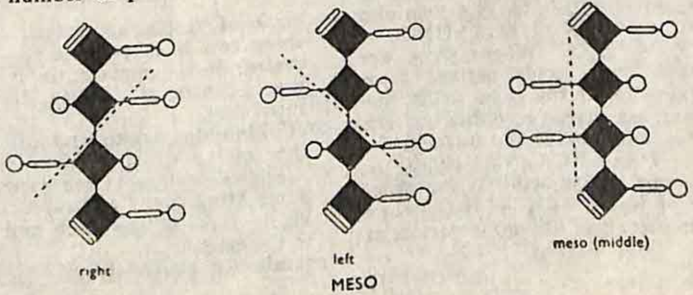
mero-/ – part. **'mero'genesis** ('mero'dʒenisis) – dividing up into parts. **'mero'zoite** – ↓ /-zoite.

/-merous (mərəs) – arranged in sets of (. . .) parts, e.g. **'trimerous** – arranged in sets of three parts.

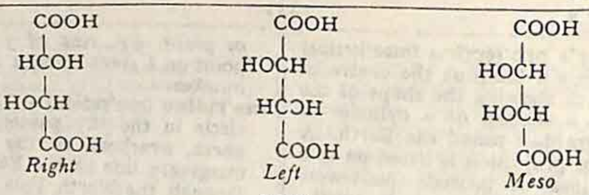
mes-/-o-/ – middle, e.g. **'mesen'cephalon** ('mesen'kefəlɔn) – the middle brain. **'mesentery** ('mesənteri) – layer of membrane which holds the small intestine (bowel) in place. **'mesophyll** ('mesofil) – the soft middle of a leaf (i.e. between the upper and lower skins). **'mesophyte** – plant which lives in conditions which are not very hot, very cold, very wet, etc.

'mescalin ('meskəlin) – drug obtained from a cactus it causes dreams which seem real.

meso-/ – (chemistry) e.g. meso-tartaric acid. The diagram shows the arrangement of the atoms in three kinds of tartaric acid. The three kinds are the same chemically. In (1) both the upper and lower parts cause a beam of ↓ polarized light to twist to the right. In (2) both the upper and lower parts cause a twisting to the left. In (3) the twisting effects of the two parts are opposite and balance each other.


right left meso (middle)

MESO



$$\begin{array}{c} COOH \\ | \\ HCOH \\ | \\ HOCH \\ | \\ COOH \end{array} \qquad \begin{array}{c} COOH \\ | \\ HOCH \\ | \\ HCOH \\ | \\ COOH \end{array} \qquad \begin{array}{c} COOH \\ | \\ HOCH \\ | \\ HOCH \\ | \\ COOH \end{array}$$

Right *Left* *Meso*

MESO

This kind of tartaric acid (the meso form) does not twist a beam of polarized light. In a meso-compound there is no twisting of polarized light because of the opposite effects of two parts of the molecule. ↓ racemic.

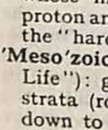
'meson ('miisɔn) – charged particle whose mass is between that of a proton and an electron. Mesons form the "hard" part of ↓ cosmic rays.

'Meso'zoic ('meso'zouik) – ("Middle-Life"): geological age as shown by strata (rock layers) from about 200 down to 70 million years ago. The Mesozoic age lies between the Palaeozoic (ancient life) and Cainozoic (recent life). The living things were very large lizards, also the earliest form of bird; mammals (breast feeding animals) were small.

Meta – ↓ metaldehyde.

meta-/ (metə) – (1) after, behind, e.g. ↓ metacarpal; (2) change, e.g. 'meta'chrosis (change of colour in animals).

meta-/ (chemistry) – (1) In the benzene ring, e.g. as shown, the two groups *X* and *Y* are in the meta-position to each other, e.g. m-dichlor-benzene. ↓ ortho, ↓ para; (2) An acid is often a compound of an oxide with water (or can be thought of as such); e.g. sulphuric acid = H_2SO_4: this can be thought of as $SO_3 + H_2O$. So also nitric acid, HNO_3; here $2HNO_3 = N_2O_5 + H_2O$. Where there are several such acids derived from (coming from) the same oxide, the names are given according to the proportion of oxide and water in the acid. Thus silicon oxide (silica) = SiO_2: metasilicic acid has *one* molecule of water, $SiO_2 + H_2O$; while orthosilicic acid has *two* molecules of water, $SiO_2 + 2H_2O$.



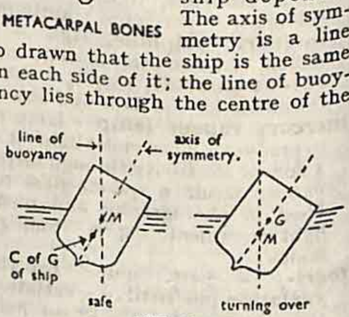
META-/

me'tabolism (me'tæbɔlizm) – all the changes (building up and breaking down of substances) going on in a living body. **me'tabolite** – substance resulting from metabolism.

'meta'carpal bones ('metə'kaapl) – bones behind the wrist bones (carpals), i.e. the long bones seen in the back of the hand.

METACARPAL BONES

'metacentre ('metəsentə) – point on whose position the safe floating (or turning over) of a ship depends. The axis of symmetry is a line so drawn that the ship is the same on each side of it; the line of buoyancy lies through the centre of the mass of displaced water. Where these two lines cross is the metacentre. If the metacentre is below the ↓ Centre of Gravity, the ship turns over.



METACENTRE

met'aldehyde – white solid formed by the joining of three molecules of ↓ acetaldehyde, sold under the trade name **Meta fuel** ('miitə -) for burning; also for killing snails and slugs in the garden.

'metalizing ('metəlaiziŋ) – covering a metal or glass with a protective covering of another metal. Powdered metal is put into an instrument; it is melted in an oxygen-acetylene (or oxy-hydrogen) flame and blown by a stream of air on to the surface. Used also to build up worn parts of a machine.

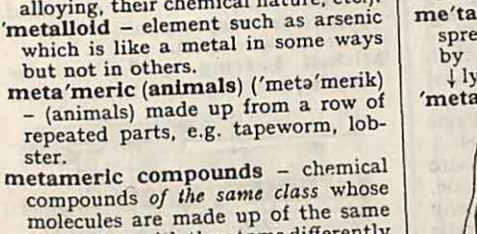
metal'lography – the study of solid metals and alloys, their manufacture and treatment in use. **me'tallurgy** (me'tælədʒi) – the general study of metals (finding, getting from the ore, alloying, their chemical nature, etc.).

'metalloid – element such as arsenic which is like a metal in some ways but not in others.

meta'meric (animals) ('metə'merik) – (animals) made up from a row of repeated parts, e.g. tapeworm, lobster.

metameric compounds – chemical compounds *of the same class* whose molecules are made up of the same atoms, but with the atoms differently arranged. The compounds have different (but related) properties (qualities, actions). Example –

$$\left.\begin{array}{l}\text{Diethyl ether, } C_2H_5O.C_2H_5\\ \text{Methyl propylether, } CH_3.O.C_3H_7\end{array}\right\} = C_4H_{10}O.$$



METAMERIC COMPOUND

(↓ Isomers are not necessarily of the same class, e.g. di-ethyl-ether and butyl alcohol are isomers.)

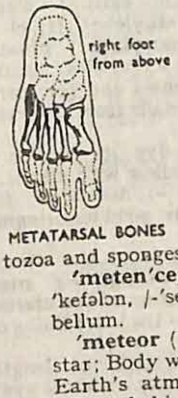
'meta'morphic rocks – ("changed form") – rocks produced from earlier existing rocks by heat, pressure (etc.) within the Earth. Examples: clay is **metamorphosed** into slate (used for roofs), limestone into marble.

meta'morphosis (metə'mɔɔfosis) – great change of form in a very short time, e.g. of an insect in passing from its larval stage into its adult form.

'meta'stable state ('metə'steibl -) – state in which a substance is unchanging but needs only a very small impulse to start a change, e.g. a strong solution ready to crystallize (if a small crystal is dropped into it), an atom in an excited state which will send out radiation if (e.g.) another atom strikes it. **metastable compound** – compound which is in a metastable state.

me'tastasis (me'tæstəsis) – the spreading of diseased growth (cancer) by cells carried by the blood or ↓ lymph to other parts of the body.

'meta'tarsal bones – (tarsus = instep = arch of foot): bones of the foot, as shown.



METATARSAL BONES

Meta'zoa (-'zouə) – creatures made up of two or more layers of cells – that is, all creatures except the one-celled ↓ Protozoa and sponges.

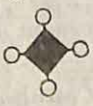
'meten'cephalon ('meten'kefəlɔn, /-'sefəlɔn) – = ↓ cerebellum.

'meteor ('miitiɔɔ) – shooting star; Body which comes into the Earth's atmosphere from outside and shines brightly because of the heat produced in its passing through the air. **'meteorite** ('miitiɔrait) – small meteor.

'meteo'rology ('miitiɔɔ'rɔlədʒi) – the study of the weather.

/-'meter – measuring instrument, e.g. volt-meter.

'methane ('meθein) – CH_4 – the simplest compound of carbon and hydrogen; also called "natural gas," marsh gas (= gas which comes up out of wet, muddy lands), firedamp (gas causing explosions in coal mines).



CH_4

METHANE

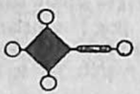
'methanol ('meθənɔl) = ↓ methyl alcohol.

'methionine – an ↓ essential amino-acid.

'metho'pterin – ↓ /-pterins.

me'thoxy-/-l-/ (me'θɔksi-) – substance containing the group CH$_3$O–, e.g. p-methoxy-benzoic acid, CH$_3$O, C$_6$H$_4$.COOH.

'methyl ('meθil) – the group CH$_3$–, e.g. **methyl alcohol,** CH$_3$OH (also called wood spirit).



CH$_3$OH

methyl alcohol

METHYL

'methylene ('meθiliin) – the group of atoms CH$_2$, e.g. methylene chloride – CH$_2$Cl$_2$; hexamethylene (= cyclo-hexane) – (CH$_2$)$_6$. The hydrocarbon "methylene" (CH$_2$) does not exist as a single molecule (unlike ethylene C$_2$H$_4$, etc.).

'methyl - me'thacrylate plastic (- me'θækrileit -) – very clear plastic, used to make lenses and for many other purposes; made from ↓ acrylic acid.

'methyl orange – dye; its solution is red with acids, yellow with alkalis.

'metol ('miitɔl) – developer for photographic films; good for bringing out fine detail.

metr-/-o-/ (metr-) – of the uterus (organ of child-bearing), e.g. **me'tritis** – inflammation of the uterus. **'endo'metrium** – the inner lining of the uterus.

'metre ('miitə) – unit of length (roughly 39·37 inches). **'metric system** ('metrik -) – system of measures (calculated in tens) based on the metre and the gramme, used in scientific work. **metric ton** – 1,000 kilograms, 2204·6 pounds.

me'trology (me'trɔ-) – the scientific study of exact measurement, e.g. how to make the very exact measures needed for scientific work.

/-metry (-metri) – measurement, e.g. **thermometry** – measurement of temperature.

Mev – million ↓ electron-volts.

'mezzanine ('mezəniin) – a part-floor in between two other floors of a building.

mf – ↓ microfarad.

Mg – chemical sign for ↓ magnesium.

mg – ↓ milligram.

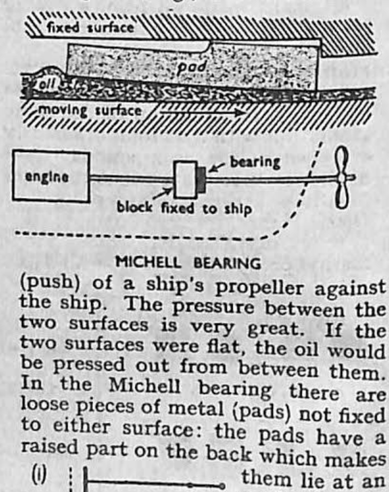
mho (mou) – the conductance (power of conducting electricity) of a Body (e.g. wire) whose resistance is one ↓ ohm. If the resistance is 5 ohms, the conductance is 1/5 mho.

mica ('maikə) – glass-like substance which can be split into very thin layers, much used as an insulator in electrical instruments.

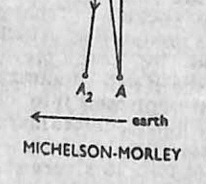
mi'cellar (mai'selə) – of very small size and irregular shape, like a bread-crumb.

mi'celle (mi'sel) – an electrified particle (an ion) in a colloid (jelly or glue-like substance).

'Michell bearing – the machine bearing used, e.g., to take the thrust (push) of a ship's propeller against the ship. The pressure between the two surfaces is very great. If the two surfaces were flat, the oil would be pressed out from between them. In the Michell bearing there are loose pieces of metal (pads) not fixed to either surface: the pads have a raised part on the back which makes them lie at an angle to the surfaces; as the bearing turns oil is carried in under the pad.



MICHELL BEARING



MICHELSON-MORLEY

'Michelson-'Morley ex'periment ('maikəlsən-'mɔɔli) – In Diagram (1) *A* is a source of light. *M* a mirror. Light leaves A, is reflected by M and comes back to A. If the Earth is moving in the direction shown by the arrow, the mirror will have been carried to M_1 by the time the light reaches it, and A will have been carried to A_1 by the time the light comes back. So the light travels from A to M_1 to A_1. In (2) the mirror is placed at the same distance in a direction at right-angles to that in (1). Light leaves A, is reflected by the mirror which has been carried to M_2, and comes back to the source which has now reached A_2. The light travels from A to M_2, to A_2. The paths AM_1A_1 and AM_2A_2, are not equal. So light travelling to a distant mirror and back in one direction should take a different time from light travelling to and back from an equally distant mirror in a direction at right-angles. Michelson-Morley found no difference in the time, i.e. they failed to prove that the Earth is moving through the "ether" (imagined material in which light, etc. travels).

Fitzgerald and Lorentz showed that this result could be explained if a bar is shortened when it travels in the direction of its length. (A bar 1 metre long, travelling with a velocity (speed) v in the direction of its length, is

$$\sqrt{1-\frac{v^2}{c^2}} \text{ metre long;}$$

(c is the velocity of light).) This shortening is called the **Fitzgerald-Lorentz contraction.** These results led to the theory of ↓ relativity.

'micro-/ ('maikro-) – (1) small, e.g. **'micro'cephalic** (-'sefəlik) – having a very small head: (2) one millionth, e.g. **microfarad** – one millionth part of a ↓ farad.

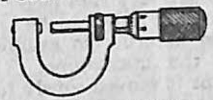
micro-climate – the physical conditions (e.g. temperature, dampness, amount of sunlight) of a small area, e.g. a wood, a field, a flower-bed. (Contrast the climate of a whole country.)

'micro'cosmic salt (-'kɔzmik) – sodium ammonium hydrogen phosphate, $NaNH_4HPO$.

'microfilm – books, letters, etc., photographed on to cinema film and read by showing the film on a screen.

'microlock – system of sending and receiving radio waves in which a very narrow band of wavelengths is used and the receiver automatically adjusts itself very accurately to the in-coming waves. Used in artificial ↓ satellites, etc.

mi'crometer – instrument for making very small measurements by means of a microscope. **micrometer gauge** – U-shaped instrument used for exact measuring; the cross piece in the opening of the U is screwed in and out.

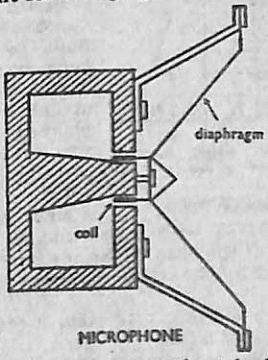


MICROMETER GAUGE

'micron ('maikrɔn) – $\frac{1}{1000}$th of a millimetre (millimetre = 0·039 inch); = 0·000039 inch; sometimes written μ.

'micro-'organism – organism (living thing) which is too small to be seen clearly (e.g. an ↓ amoeba) or at all (e.g. a bacterium) without a microscope.

'microphone ('maikrofoun) – instrument for changing sound waves into electricity, as part of a telephone or of a radio-sending instrument. There are various kinds; in that shown the sound waves cause the diaphragm (plate) to vibrate, so moving the coils between the poles of the magnet, and so generating a small current of electricity.



MICROPHONE

'micropyle – very small hole, e.g. in an unfertilized ovule (seed) through which the nucleus from the pollen enters.

'micro'second – one millionth of a second.

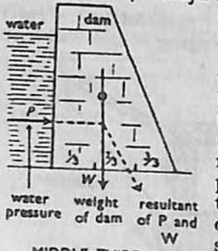
'micro'seism ('maikro'sii.izm) – a small tremor (shake) in the Earth's rocks.

'microtome ('maikrotoum) – instrument used to cut very thin pieces of substances so that light can be sent through them in order to examine them under the microscope. The piece to be cut is moved slowly forward by a screw, and a very sharp knife passes over the front.

'micro'tron – small machine for producing high-speed electrons. The electrons are forced by a magnet to travel in circular paths and at the beginning of each circle they receive a forward push from an electric field produced by a high-frequency radio oscillator (↓ cavity resonator).

'micro-'waves – very short radio waves (less than 20 centimetres).

'mictu'rition ('miktju'riʃən) – passing out urine from the body.



MIDDLE THIRD

middle third – A dam built to keep back the water (e.g. of a river) must be so planned that the *resultant of water *P*ressure and *W*eight of the dam falls within the middle third part of the base: *(the *one* force produced by the combined forces *P* and *W*).

'midrib – the centre stem along the middle of a leaf.

'midriff – = ↓diaphragm.

'migraine ('migrein) – very severe headache on one side of the head, with vomiting and sometimes disorder of sight.

mi'gration (mai'greiʃən) – movement of creatures (or particles of matter) from one place to another, e.g. of birds before winter.

mil – $\frac{1}{1000}$th of an inch.

mild clay – rather sandy clay. **mild steel** – steel with less carbon (and hardening alloys) as used for building; the harder (not mild) steels are used for tools, etc.

mili'aria (mili'eəriə) – prickly heat, inflammation of the sweat-glands.

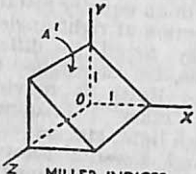
'miliary ('miliəri) – like a lot of very small (e.g. millet) seeds, e.g. **miliary 'tubercu'losis.**

Milky Way – white band seen across the sky, made up of many faintly seen stars and gas-clouds. ↓ galactic.

'millboard – thick brown paste-board as in a book cover.

milled metal – worked by machine, e.g. **milled lead** – lead rolled into sheets by machinery.

Miller 'indices (- 'indisiiz) – set of 3 numbers used to describe the position of a face of a crystal (or of any surface in the crystal): e.g. any face of the crystal shown can be described by referring its position to the lines *OX*, *OY*, *OZ*. The face *A* cuts *OX* at a distance 1 from *O*; it cuts *OY* at a distance 1 from *O*; it does not cut *OZ*. Its indices are 1 1 0.



MILLER INDICES

milli-/ (mili-) – one thousand, (more usually), one thousandth. **'milliard** – 1,000 millions. **'milliammeter** – ammeter marked in $\frac{1}{1000}$ths of an ampere. **millibar** – unit of measure of atmospheric pressure; one bar = a pressure of 75·007 centimetres of mercury at 60° C. in latitude 45°: millibar = $\frac{1}{1000}$th of this. **'millilitre** ('mililiitə) – $\frac{1}{1000}$th of a litre, i.e. the volume of 1 gramme of pure water at 4° C.; almost (but not quite) the same as 1 cubic centimetre.

milling – (1) (cloth) – pressing and rubbing cloth in soap, alkali (or acid) and water so as to shrink it (make it draw together and become smaller) and to get a smooth surface; (2) (metal) – cutting by means of revolving teeth.

'Millstone Grit – sandy rock (the

sand-grains being angular, not rounded), found between the limestone strata (layers) and the coal layers above it.

milt (milt) – the male organ of a fish; the male sex cells of a fish with which the eggs are fertilized.

mi'metic (mai'metik) – imitating. **'mimicry** ('mimikri) – (in animals) imitating the colour or behaviour of other animals or plants as a means of self-protection.

'mineral – ('minərəl) – (1) (roughly) substance got from a mine; (2) substance produced by the processes of non-living nature; (3) (in science) substance so produced having a definite (fixed) composition, e.g. limestone consists chiefly of one mineral; granite consists of three minerals (feldspar, mica, quartz). **mineral oil** – petroleum. **'mine'ralogy** ('minə'rælədʒi) – scientific study of minerals.

'minim ('minim) – unit measure: 60 minims = 1 fluid drachma: 1 minim = 0·06 cubic centimetre.

Min'kowski world (min'kɔfski -) – In order to make easier the difficult ideas needed in thinking about ↓relativity, Minkowski proposed to use four *co-ordinates: – (1) height, (2) breadth, (3) distance as in a solid, and (4) time: *(co-ordinates = measures in space used to describe where a thing is).

'minus colour ('mainəs -) – (in colour photography): e.g. minus red = white light with all the red light taken out (= ↓cyan). ↓subtractive.

'Miocene ('maiosiin) – geological period starting about 35 million years ago, and lasting about 20 million years (until 15 million years ago). The plants and animals were earlier forms of those of today. The Alps and Himalayan mountains were formed in this period.

mi'otic (mai'ɔtik) – causing the pupil (centre) of the eye to contract.

'mira'cidia ('mirə'sidiə) – ↓cercaria.

'mirage ('miraaʒ) – reflection of light by a layer of rarified (less dense) air so that (e.g.) travellers in the desert think they see water where (in fact) there is none.

mirror machine – apparatus in which a very hot gas (↓plasma) is held in a small space by reflecting it back by means of a magnetic field when it tries to escape. Used in ↓thermonuclear studies.

mis'carriage – birth of a child before the twenty-eighth week instead of at the full time.

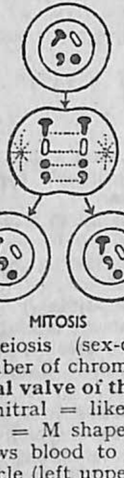
'miscible ('misibl) – which can be mixed.

mis'pickel – iron and arsenic sulphides – an ore of arsenic.

'missile ('misail) – (military) an aircraft without a pilot; or a rocket. There are two types: (1) **guided missile** – missile which is steered by radio or steers itself (↓homing); (2) **ballistic missile** – which for most of its flight is not controlled.

'mito-/ – thread. **'mito'chondria** ('maito'kɔndriə) – thread-like or rod-like bodies in living cells which are believed to produce substances affecting the chemical actions within the cells.

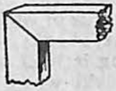
mi'tosis (mai'tousis) – the series of changes of a cell in the process of dividing to form two growth- (not sex-) cells. The chromosomes (character-bearing particles) divide so that each cell has a complete set, exactly the same as those in other cells: in ↓meiosis (sex-cell-formation) the number of chromosomes is halved.



MITOSIS

'mitral valve of the heart ('maitrəl -) – (mitral = like a mitre (bishop's hat) = M shaped) – opening which allows blood to pass from the left auricle (left upper part) into the left ventricle (left lower part) of the heart but not a flow back. **mitral stenosis** (- ste'nousis) – narrowing of the mitral valve owing to thickened re-growth of damaged tissue.

'mitre ('maitə) – wood joint for joining



MITRE

wood at an angle, e.g. corners of a picture frame. **mitre block** – piece of wood with saw cuts in it at an angle, to help in cutting mitre joints.

ml. – millilitre = $\frac{1}{1000}$th litre. **mm.** – millimetre. **mμ**– milli-micron.

Mn – chemical sign for ↓manganese.

mnem-/ – memory. **mne'monic device** (ni'mɔnik -) – formula or saying to help the remembering of something else, e.g. "**Rest** = **Coffin** under **Earth**," to remember:

$$\text{Resistance} = \frac{\text{Electromotive force.}}{\text{Current}}$$

Mo – chemical sign for ↓molybdenum.

mock moon – image of the moon seen near the moon usually when it is near setting, caused by ↓refraction by ice crystals in the air. So also **mock sun.**

'mock-up – aeroplane (or part) made full-size in wood so as to help the designer to work out the details.

mode (moud) – the most commonly found measure (mark, etc.) in a set of measures, e.g.

mark	10	9	8	7	6	5
number of boys getting this mark	1	5	13	16	10	4

The mode is 7.

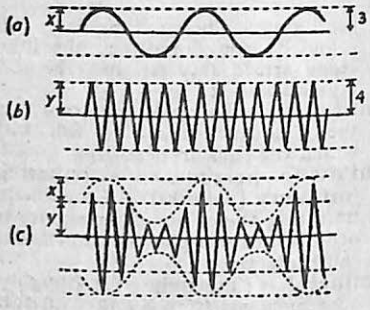
'moderator ('mɔdəreitə) – ↓reactor.

'modern face – (printer's type) as shown: modern face.

'modifi'cation – change in a creature or plant produced by forces in its surroundings and lasting only as long as those forces last.

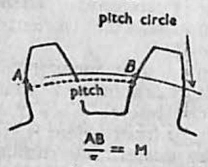
'modular ratio ('mɔdjulə -) – ratio (relation) between ↓modulus of elasticity of (e.g.) steel and that of cement. E. Steel/E. Cement = modular ratio = 15.

'modu'lation – putting into a radio carrier-wave the wave which represents the sounds, television picture or message. The diagram shows **amplitude modulation.** (*a*) represents the speech sounds, (*b*) the carrier wave, (*c*) the modulated wave which is radiated (sent out). The **depth of modulation** is $x \div y$. e.g. $3 \div 4 = 75\%$. In **frequency modulation,** the frequency of the carrier-wave is made to vary in such a way that the variations represent the sounds (etc.).



MODULATION

'module – (of gear teeth): the ↓pitch (distance between corresponding parts of gear teeth) divided by π (3·1416).



MODULE

'modulus of 'elas'ticity ('mɔdjuləs) – roughly, measure of the change of size or shape produced in a substance according to the forces which act on it. Exactly, stress (= inside forces per unit area caused by outside forces) ÷ strain (= relative change in size or shape). **bulk modulus** – the modulus which relates to change in volume, e.g. compressing a stone. **ri'gidity modulus** (ri'dʒiditi -) – the modulus which relates to change in shape, e.g. twisting a rod. **Young's modulus** – the modulus which relates to change in length, e.g. stretching a rod.

mo'ellen (mo'elən) – also called De'gras; fat extracted from sheepskins in making leather, used to make lanolin (white fat, used for rubbing on sore places).

'mohair ('mouheə) – wool made of very long fibres, e.g. those of the Angora goat: (cloth) cloth made of fine cotton (long ways threads) and fine wool (across).

Mohs' scale of hardness (moz -) – arrangement of ten minerals in order of hardness: – (1) Talc . . . (8) Topaz, (9) Corundum, (10) Diamond. If a substance can scratch Corundum, but is scratched by Diamond, its number is 9½.

'moiré ('mɔirei) – "watered (silk)," (silk) with irregular rough and smooth surface markings, made by wetting the cloth, folding it in a special way and then using great pressure on it; (or, more cheaply, by metal rollers with raised markings).

mol, mole (mɔl, moul) – gramme molecule, e.g. oxygen atoms (atomic weight, 16) are joined in sets of 2, – O_2: the molecular weight of oxygen is $2 \times 16 = 32$; 32 grammes is one mol, mole, or gramme-molecule of oxygen. So also one mol, mole, gramme-molecule of CO_2 is 44 ($12 + 2 \times 16$) grammes. ↓ molecular weight.

'molar teeth ('moulə -) – the last 3 flat-topped grinding teeth on each side of the upper and lower jaws.

mole (moul) – (1) ↓ mol; (2) wall built out into the sea, e.g. to protect a harbour; (3) dark-coloured raised hairy spot growing on the skin. (4) small, rat-like animal which makes passages under the ground. **mole-drainer** – instrument pulled through the soil to cut draining-holes in it.

mo'lecular (mo'lekjulə) – of a molecule; which would be produced by one gramme-molecule: (↓ mol, mole). **molecular weight** – weight of a molecule compared with the weight of a hydrogen atom. E.g. the CO_2 molecule consists of one C atom (atomic weight 12) and two oxygen atoms (atomic weight 16); its M.W. is $12 + 2 \times 16 = 44$.

molecular clock – ↓ atomic clock.

molecular forces – ↓ Van der Waals.

'molecule – ('molikjul) – An atom is the smallest possible part of an element which still *is* the element; a molecule is the smallest particle of a substance which can exist on its own. It usually consists of a group of atoms held together by electrical forces; the atoms may be different (as in a compound), e.g. H_2O (a molecule of water), or alike (as in some elements), e.g. H_2 (a molecule of hydrogen).

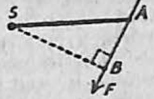
'Mollier diagram ('mɔliə) – A diagram used for calculating the state of liquids and vapours in ↓ turbines and in other engines. It shows total heat, pressure, quality (dryness = absence of liquid in the steam), volume (space filled): all these are in terms of a certain unit mass (e.g. pound or grammes of water).

Mol'lusca (mɔ'lʌskə) – the great class of creatures with shells – mussels, oysters, cuttlefish, snails, etc.

MOLLUSCA

mo'lybdenum (mo'libdinəm) – metal element, used for the hooks carrying the wires in an electric lamp, for electrodes and (especially) to make High Speed Steel (alloy used for steel tools which remain sharp even when very hot and after long use).

'moment ('moumənt) – (of a force): the turning power of a force. *SA* is a bar held in a a support *S* on which it can turn (e.g. a hinge or bearing). It is made to turn by the force *F*. The moment of the force is *F* (strength measured, e.g., in lbs.) × *SB* (right-angle distance from *S* to the force). ↓ lever.



MOMENT OF A FORCE

'moment – (of a magnet): a measure of the strength of a magnet; it is calculated from the twisting forces which try to make a magnet lie longways in the magnetic field of other magnets acting on it.

'moment of i'nertia (- i'nəəʃiə) – It is harder to set a heavy wheel turning at a certain speed (or to stop it from turning) than a less heavy wheel. The moment of inertia of a Body is a measure of the difficulty in changing its speed of turning. It depends upon the position of the axle, the shape of the Body, its weight, and how the weight is distributed (spread out). ↓ radius of gyration.

mo'mentum (mo'mentəm) – (of a Body) mass × velocity (speed): e.g. a ball weighing 200 grammes travelling at 100 centimetres per second has a momentum of 200 × 100 = 20,000 (centimetre-gramme-second units). Bodies with equal **momenta** require equal forces to stop them in the same time.

mon-/ – one, e.g. **mon'aural** (mɔ'nɔɔrəl) – for one ear. **mon'androus** – having one stamen (pollen producing organ). ↓ mono-.

'mona'tomic element – element whose molecules contain only one atom; its atoms do not combine. e.g., helium, but not oxygen.

Mond gas (mɔnd -) – gas mixture of carbon monoxide, carbon dioxide, hydrogen and nitrogen, produced by passing air and steam over coal at 650° C.; also called semi-water gas. ↓ water gas.

Mond process – way of extracting nickel from copper-nickel sulphides by (1) oxidizing; (2) treating with sulphuric acid to extract some of the copper; (3) reducing (= deoxidizing) the nickel with hydrogen; (4) forming nickel carbonyl $Ni(CO)_4$ by passing carbon monoxide over it; and then breaking down the compound to form pure nickel. (British 1839–1900.)

'Monel metal ('mɔnel -) – alloy of nickel, copper, iron, manganese, silicon, carbon; very strong; very resistant to chemical action; used in ships' engines, chemical factories, and food factories.

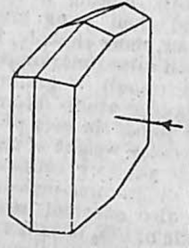
'Mongol idiot ('mɔŋgɔl -) – person, usually of low mental power, with a round head, short thick hands and feet: often the last child of old parents.

'monkey ('mʌŋki) – the hook which releases the weight, or the weight itself, used for driving posts into the ground. **monkey wrench** (- renʃ) – spanner (tool for screwing up nuts) with a variable opening to fit various sized nuts.

'mono-/ ('mɔno-) – one, single; e.g. **'monochro'matic light** – light of only one colour (wavelength).

'mono'basic acid ('mɔno'beisik -) – acid which contains one hydrogen atom which can be replaced by a metal to form a salt, e.g. nitric acid, HNO_3, but not sulphuric acid, H_2SO_4 which is dibasic.

'mono'clinic crystal system (-'klinik-), **'monosym'metric crystal system.** A crystal of this shape has one axis about which it can be turned so that corners, edges and faces come into the same positions, and one plane (surface) at right angles to the axis which divides the crystal into similar halves. Examples: borax, gypsum.



MONOCLINIC

'monococque ('mɔnokɔk) – way of building an aeroplane so that the shell (not a system of beams) carries the weight; also called Stressed Skin.

'monocoty'ledon (-kɔti'liidɔn) – plant (e.g. grass, wheat) which has only one seed-leaf.

mo'noecious (mɔ'niiʃiəs) – (*oec-/* = house, home): having separate male and female flowers on different parts of the one plant, e.g. hazel tree. **dioecious** (dai-) – with male and female flowers on different plants, each plant having only one sex, e.g. willow.

'monolayer, 'monomo'lecular layer – layer, e.g. of oil on water, which is only one molecule thick.

'monolith – pillar or foundation made of one single block of stone or cement.

'monomer – ↓ /-mer.

'mono'podial tree ('mɔno'poudiəl) – e.g. fir tree, the main stem increases in height by a yearly bud at the top: side buds produce

MONOPODIAL TREE

side branches, the oldest at the bottom. The branches grow in the same way as the stem. This produces a very regular pointed shape of tree.

ˈmonoˈsaccharide (-ˈsækəraid) – a simple sugar made of a straight chain or single ring of carbon atoms.

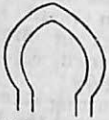
ˈmonosyˈmmetric – = ↓ monoclinic.

ˈMonotype – machine which casts printer's type letter by letter. The letters of the words are first cut as a system of holes in a strip of paper. This paper is put into a machine which casts type as represented by the holes. The type is then divided into lines and used for printing: (trade name).

ˈmontage (ˈmɔnteidʒ) – joining photographs together to make a picture; joining bits of cinema film to give an idea, e.g. idea of a journey by pictures of different places one after another.

Monte Carlo method – a mathematical method of imitating chance happenings in nature.

ˈMoorish arch – arch which curves in at the bottom like a horse-shoe.


MOORISH ARCH

moˈraine (mɔˈrein) – rocks, stones, etc., left in its track by a glacier (moving mass of ice).

ˈmorbid (ˈmɔɔbid) – diseased. **morbid aˈnatomy** – the dissection (cutting up) and study of diseased tissues and organs. **morˈbidity rate** – per cent of persons in a certain area who suffer from a certain disease in a certain year or years.

ˈmorbilli (ˈmɔɔbilai) = ↓ measles.

ˈmordants (ˈmɔɔdənts) – substances, e.g. salts, with which cloth (or thread) is treated before it is dyed. The mordant combines with the substance of the cloth; then the dye combines with it.

ˈmoron (ˈmɔrɔn) – fully-grown person whose mental power is that of a child of 8–12 years.

morph/-o-/ – form, shape, e.g. **morˈphology** (mɔɔˈfɔlədʒi) – study of the form of living things, of crystals, etc. and how these forms are developed. **morˈphosis** (mɔɔˈfousis) – development of a certain form.

ˈmorphia, ˈmorphine (ˈmɔɔfiə, ˈmɔɔfiin) – the chief substance in opium which gives it its sleep-producing and pain-easing qualities.

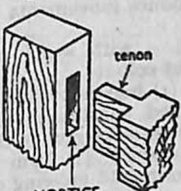
Morse code (ˈmɔɔs ˈkoud) – combinations of dots and dashes (shorts, longs) used in sending signals, e.g.

— —   — — —   ·—·   · · ·   ·
M   O   R   S   E

(American, 1791–1872.)

PESTLE AND MORTAR

ˈmortar (ˈmɔɔtə) – (1) strong cup used with a **pestle** for grinding; (2) lime, cement, sand mixture used to join bricks in building; (3) kind of short gun for firing shells at a high angle.



MORTICE

ˈmortice, -se (ˈmɔɔtis) – the hole cut to receive a ˈtenon (ˈtenən) in a **mortice and tenon joint. mortice bolt, mortice - lock** – bolt or lock which fits into a hole cut in the edge of the door. **mortice chisel** – a very strong chisel used for cutting mortices.

MORTICE CHISEL

ˈmorula (ˈmɔrjulə) – solid ball of cells formed by a growing fertilized egg-cell (as in the early stages of formation of young): it later becomes a hollow ↓ blastula.

moˈsaic (mouˈzei.ik) – (1) design or picture made up of little pieces of coloured stone set together in a bed of cement; (2) the plate covered with spots of light - sensitive substance in an ↓ iconoscope (for

MOSAIC

sending out television). **mosaic disease** – plant-disease causing mosaic-like discolouring of the leaf, e.g., of tomato plants; caused by a ↓ virus.

mo'saic gold – substance which looks like gold dust, formed by heating tin, mercury, ammonium chloride, sulphur. Used as colouring matter.

'Moseley's law ('mouzliz -) – (First see X-ray spectrometer). The wave-frequencies of the *K* lines of different elements (as shown by their position on an X-ray spectrograph) are proportional to the squares of the ↓ atomic numbers of those elements.

'motile ('moutail) – able to move about.

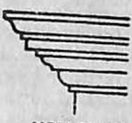
'motion study – study (e.g. by cinema film) of the movements of a worker in doing certain work, so as to discover a better and easier way of doing it.

'motor nerve – nerve carrying impulses which produce movements of muscles.

'mottled ('mɔtld) – with spots (or areas) of different colours.

mould (mould) – (1) hollow container into which melted substance (e.g. metal) is poured so as to give it the shape of the container; (2) form of fungus, e.g. green mould growing on old bread.

mould board – the curved blade of a plough which causes the earth (**mould**), as it is ploughed up, to turn over.



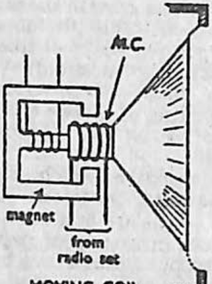
MOULDINGS

'mouldings ('mouldiŋz) – ornamental bands standing out from a wall or pillar.

Mous'terian period (maus'tiiəriən) – period (about 50–100 thousand years ago) when the ↓ Neanderthal man existed. He was a very early, animal-like type of man. The period is named after Le Moustier (a place in France).

movement of a watch – the machinery, not the case.

moving coil – electrical instrument which depends on the movement of a coil, carrying a current, in the field of a magnet, e.g. **moving coil loud speaker** – see diagram: current passing through the coil causes it to move.



MOVING COIL LOUD SPEAKER

Mu, µ (mjuu) – ↓ micro, micron. **Mu factor** – ↓ amplication factor.

Mu-metal – an alloy of iron, nickel, copper, manganese, used for the core (centre) of electromagnets: it can be magnetized very strongly.

'mucilage ('mjuusilidʒ) – vegetable glue.

'mucous 'membrane ('mjuukəs -), **mu'cosa** – the lining membranes of the nose and throat, bowel, etc.: they contain **mucous glands** – glands producing a jelly-like liquid, **mucus**; e.g. there is a great flow of mucus from the nose when one has a cold.

'muffle-furnace, -kiln (mʌfl -) – furnace with firebrick or fireclay heated from outside, used, e.g., for firing (hardening) pottery.

'mulching ('mʌlʃiŋ) – putting manure, e.g. horse droppings, round the base of the stem of a plant to feed the roots, keep in the moisture, and protect against cold.

mule (mjuul) – spinning machine with a moving part which spins the fibres into thread as it moves outwards, and lets the thread wind on to bobbins (wooden holders) as it moves back.

'mullion ('mʌliən) – upright bar in a window, separating two panes (sheets) of glass.

'multi-/ (mʌlti) – many, e.g. **'multi-'cellular** (-'seljulə) – consisting of many cells. **mul'tiparous** (mʌl'tipærəs) – (woman) who has had many children. **'multiple** – made up of many parts, e.g. **multiple disc-clutch** – clutch = instrument which joins or separates the driving power of the engine from the car; multiple disc-clutch – clutch which works by pressing together a number of flat plates, or separating these plates to set the engine free.

'multiple pro'portions, Law of – If one element combines with different weights of another element to form two (or more) different substances, these different weights are simply related (e.g. one twice the other). Example: 63 grammes of copper combine with 8 grammes of oxygen to form red copper oxide; 63 grammes of copper combine with 16 (8 × 2) grammes of oxygen to form black copper oxide.

'multi'plex – method of sending several messages along the same telegraph wire at the same time.

multistage rocket – arrangement of several rockets joined one behind the other. The back one fires first and drops off when it has run out of fuel; then the second one fires, and so on.

mumps (mʌmps) – infectious disease due to a ↓ virus; it causes inflammation of the salivary glands: (which produce the liquid in the mouth). ↓ parotid.

Muntz metal (muntz -) – alloy of copper and zinc used, e.g., for the bottom of ships.

'muri'atic acid ('mjuuri'ætik) – old name for ↓ hydrochloric acid.

'murmur ('məəmə) – sound heard in the heart when its action is disordered owing to a fault in the valves.

'muscae voli'tantes ('mʌskii-vɔli'tæntiiz) – ("insects flying") – black spots seen in front of the eye when looking at a white surface in a bright light, especially when one is in weak health.

'muscarine ('mʌskæriin) – poison found in toadstools (mushroom-like fungus).

'Musci ('mʌskai) – the mosses.

'muscovite ('mʌskəvait) – white mica in the form of sheets as used in electrical work.

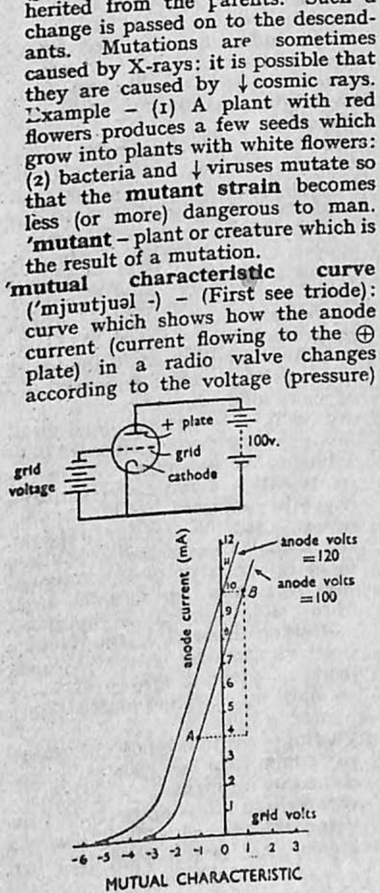
'musculature ('mʌskjulətjuə) – the arrangement of muscles in the body.

mustard oils – Mustard gas (a compound of sulphur, hydrocarbon groups and chlorine) and nitrogen mustards (similar compounds but with nitrogen in place of sulphur) cause blisters on the skin and could be used in chemical warfare. Nitrogen mustards are used to cause diseased growths (↓ cancer) for purposes of study.

'mutaro'tation ('mjuutəro'teiʃən) – the change in the power of twisting ↓ polarized light by a solution (especially certain sugars) as the solution gets old.

mu'tation (mju'teiʃən) – the beginning of a new character in an offspring (plant or animal) which is not inherited from the parents. Such a change is passed on to the descendants. Mutations are sometimes caused by X-rays: it is possible that they are caused by ↓ cosmic rays. Example – (1) A plant with red flowers produces a few seeds which grow into plants with white flowers: (2) bacteria and ↓ viruses mutate so that the **mutant strain** becomes less (or more) dangerous to man.
'mutant – plant or creature which is the result of a mutation.

'mutual characteristic curve ('mjuutjuəl -) – (First see triode): curve which shows how the anode current (current flowing to the ⊕ plate) in a radio valve changes according to the voltage (pressure)



MUTUAL CHARACTERISTIC

on the grid. There is a separate curve for each voltage in the anode circuit. The anode current is usually written in milli-amps (mA = $\frac{1}{1000}$ ampere). **'mutual con'ductance** – the change in anode current divided by the change in grid voltage which causes it. In the diagram, the anode current is 4 mA. when grid voltage is ⊖ 1 (point *A*). The anode current is 10 mA. when grid voltage is ⊕ 1 (point *B*). The anode current changes by 10 − 4 = 6 mA. when the grid voltage changes from ⊖ 1 to ⊕ 1, i.e. by 2. So the mutual conductance = 6 mA. ÷ 2 volts = 3 mA. per volt.

mutual induction – ↓electromagnetic induction.

my-/-o-/ – of the muscles, e.g. **my'algia** (mai'ældʒiə) – pain in a muscle.

myas'thenia gravis (maiæs'θiiniə-'grævis) – ("serious weakness of the muscles") – disease causing muscular weakness owing to failure in the chemical action at the nerve endings: ↓acetylcholine; believed due to diseased growth in the ↓thymus gland.

myc-/-o-/ – having to do with a fungus or fungi.

my'celium (mai'siiliəm) – the white mass of threads which form the body of many kinds of fungus.

/-my'cetin, /-'mycin (mai'siitin, 'maisin) – a substance obtained from a fungus-like organism, used in the treatment of disease, e.g. **Chloromycetin** obtained from ↓actinomyces, used in treating typhoid, typhus and other diseases; it has been made in the laboratory. **Streptomycin,** used in treating some forms of tuberculosis, influenza, diphtheria and other diseases; **Aureomycin** – used for treating many diseases; increases speed of growth of young animals (e.g. pigs) and birds. ↓antibiotic.

my'cology – the study of fungi. **my'cosis** (mai'kousis) – a disease caused by a fungus.

'myco'rrhiza ('maikɔ'raizə) – the living together of a fungus and a higher plant each helping the other. The fungus often grows on, or partly in the root of e.g. heather, also orchid, beech, oak. It helps to obtain food from the soil but receives starch foods from the plant.

'mydri'atic drug ('midri'ætik) – substance which causes wide opening of the pupil of the eye, e.g. atropine.

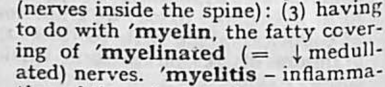
myel-/-o-/ (maiel-) – ("marrow" = the fat in the centre of a bone) – (1) having to do with bone-marrow; (2) having to do with the spinal cord (nerves inside the spine): (3) having to do with **'myelin**, the fatty covering of **'myelinated** (= ↓medullated) nerves. **'myelitis** – inflammation of the spinal cord.

'mylonite ('mailɔnait) – rock (e.g. at base of mountain), hard with lines of colour in it, formed by destruction of other rocks so that the character of the earlier rocks is completely lost.

myo-/ (maio-) – muscle, e.g. **'myocar'ditis** – inflammation of the muscular wall of the heart. ↓**my-/**.

'myo'globin ('maio'gloubin) – a protein (similar to ↓haemoglobin) found in muscles; it gives meat its red colour.

my'opia (mai'oupiə) – short sight (not being able to see distant things clearly).



MYOPIA

'myosin ('maiosin) – chief protein of muscle fibres, insoluble in water, soluble in alkaline salt-solution in which it forms a jelly; it consists of a chain of molecules which (when the muscle contracts) becomes folded up.

my'osis (mai'ousis) – narrowing of the pupil of the eye. **my'otics** (mai'ɔtiks) – drugs which cause this.

MYRIAPODA

'myriapods ('miriəpɔdz) – class of creatures with many legs; it includes millipedes and centipedes.

'myrin-/ having to do with the ear-drum. **'myrin'gitis** ('mairin'dʒaitis) – inflammation of the ear-drum.

'myrmeco-/ ('məəmiikɔ-) – having to do with ants, e.g. **myrme'cophagous** – feeding on ants.

'myxoe'dema ('mikso'diimə) – disease caused by failure of the ↓ thyroid gland; the face and hands (and other parts) are swollen; thought is slow and dull. The disease is treated with extract of thyroid gland.

'myxoma'tosis ('miksəmə'tousis) – "slime disease" – an infectious disease of rabbits caused by a ↓ virus.

'myxomy'cetes (-mai'siits) – very simple fungus-like organisms (moulds) which grow on decayed wood and in the soil.

N

N – chemical sign for ↓ nitrogen.

N.T.P. – normal temperature and pressure (0° centigrade, 76 centimetres of mercury in a barometer).

N truss – ↓ Pratt truss.

Na – chemical sign for ↓ sodium.

nab (næb) – line of rocks below water.

na'celle (næ'sel) – container for an engine separated from the body of the aeroplane (or airship).

'nacre ('neikə) – many-coloured glassy substance inside the shell of a shellfish. **'nacrous crystal** – crystal with such an appearance.

'nadir ('neidiə) – The zenith means the position directly above one's head; the nadir is the opposite – directly under one's feet (on the other side of the Earth).

'naevus ('niivəs) – a red spot on the skin (usually small, but sometimes very large, e.g. covering half the face); it is made up of a knot of very small blood vessels.

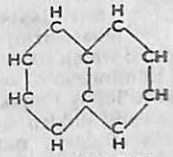
na'gana (næ'gaanə) – disease of cattle caused by the ↓ tse-tse fly.

nan-/ (nein-) – small and mis-shapen; dwarf. **'nanism, 'nanosomia** – state of being a dwarf.

nan'keen (næn'kiin) – dull coloured cotton cloth with sloping raised lines, as used for pockets.

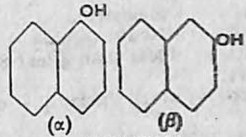
nap (næp) – the hairy surface of cloth.

'naphtha ('næfθə) – general name for mixed paraffin hydrocarbons.



NAPHTHALENE

'naphthalene ('næfθəliin) – $C_{10}H_8$; white, strong-smelling substance, sold as "moth-balls" to put among clothes; important in the manufacture of dyes: obtained from coal-tar.



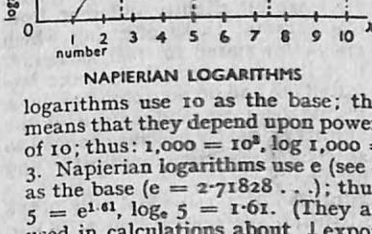
(α) (β)

NAPHTHOL

'naphthol ('næfθɔl) – $C_{10}H_7OH$; colourless crystalline substance of the same form as naphthalene but with an OH group as shown: important in dye-manufacture: β-naphthol is used as a poison for insects.

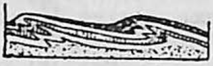
'naphthyl-a'cetic acid ('næfθil-ə'siitik) – substance which in small quantities increases growth in plants; in larger quantities it kills weeds such as charlock without harming plants of the grass family, e.g. wheat, barley.

Na'pierian 'logarithms (nei'piəriən) – natural logarithms. Ordinary logarithms use 10 as the base; this means that they depend upon powers of 10; thus: $1{,}000 = 10^3$, $\log 1{,}000 = 3$. Napierian logarithms use e (see e) as the base ($e = 2{\cdot}71828\ldots$); thus: $5 = e^{1{\cdot}61}$, $\log_e 5 = 1{\cdot}61$. (They are used in calculations about ↓ exponential and ↓ hyperbolic functions.) (Napier, Scottish, 1550–1617.)



NAPIERIAN LOGARITHMS

nappe (næp) – part of the Earth's



NAPPE

surface folded over, as in the Alps.

nar'cissism (naa'sisizm) – a disorder of the mind which consists of great love and admiration of self.

narc-/ – sleep. **'narco'lepsy** ('naako-'lepsi) – disease causing sudden, uncontrollable attacks of sleep. **nar'cosis** (naa'kousis) – very deep sleep, as produced by certain drugs. **nar'cotic drug** (naa'kɔtik) – a drug which causes sleep.

'nares ('neiriiz) – the nostrils.

narrow gauge (railway) (-geidʒ -) – railway with lines less than 4 feet 8½ inches apart.

'nasal, 'naso-/ ('neizl, 'neizo-) – of the nose.

'nascent gas ('næsənt) – gas just being formed in a chemical action (and so very active).

'naso'pharynx – ↓ pharynx.

na'tatory, nata'torial (organ) (neitə-'tɔɔriəl) – used for swimming.

'natural frequency – A pendulum of a certain length tends to swing at a certain (natural) frequency (number of swings per minute); but it can (by being pushed) be made to swing faster. So also in a certain electric circuit (with a condenser and coil) the current has a natural frequency: ↓ acceptor circuit, forced oscillations, tuning.

natural logarithm – ↓ Napierian.

natural scale – series of musical notes whose sound-frequencies are multiples of 24, 27, 30, 32, 36, 40, 45, 48.

natural selection (Theory of -) – The offspring of any animal (plant, etc.) are all slightly different from the parents; those offspring which are better suited to their surroundings live and reproduce; those less suited die and do not reproduce; as a result the form and nature of the animal gradually become changed so as to suit the surroundings better and better.

'nauplius ('nɔɔpliəs) – first form in the life-history of certain crustacea, e.g. crab, lobster, etc.

'nausea ('nɔɔsiə) – feeling of sickness and desire to vomit.

'nautical mile ('nɔɔtikəl) – $\frac{1}{60}$th of a degree of ↓ latitude; fixed in Britain as 6,000 feet. ↓ Admiralty.

Ne – chemical sign for ↓ neon.

Ne'anderthal man (ni'ændətaal) – early, animal-like type of man, about 50–100 thousand years ago: (present man is not descended from him).

NEANDERTHAL MAN

neap tide (niip) – (neap = nip = cut or press off a piece): moderate tide, 5 or 6 days before the new moon and full moon.

neat's foot oil (niits -) – (neat = cattle): oil obtained from the feet of cattle.

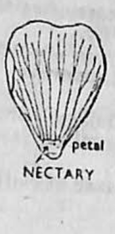
'nebula, -ae ('nebjulə) – (1) great cloud(s) of gas (usually white-hot) round some stars. (2) ↓ spiral nebulae are very distant; new star systems are probably being formed from them.

NEBULA

'nebulizer ('nebjulaizə) – instrument used to blow out liquid in a fine cloud, e.g. as a medical treatment for the throat.

NEBULIZER

necro-/ – dead, e.g. **ne'cropsy** (ne'krɔpsi) – examination of a dead body, e.g. to discover the cause of death. **ne'crosis** (ne-'krousis) – death of cells (while still in a part of the body).



NECTARY

'nectar ('nektə) – the sugary substance in plants used by bees to make honey. **'nectary** –

organ at the base of a petal where nectar is produced.

'necto-/ ('nekto-) – for swimming, e.g. **'nectopod** – limb used for swimming. **'necton, nekton** – actively swimming creatures of the sea. ↓ plankton.

needling – (1) putting needle-beams (steel bars) under a wall to carry the weight while new or strengthened foundations (bases) are made; (2) surgery (e.g. on the eye) done with a needle.

'negative ('negətiv) – photographic film from which prints are made; all the white things come out black in the negative; the black lets no light through so they come out white in the print.

'negative electricity – There are two kinds of electric charge: positive ⊕ and negative ⊖. Equal amounts of unlike charges neutralize (overcome) each other. An atom consists of a nucleus which has a ⊕ charge, with one or more very small particles (electrons, negatively charged) moving round it. A Body with more than the usual number of electrons has a negative charge; a Body with too few electrons is positively charged. The chemical actions in an electric battery cause extra electrons to collect on one plate, making it negatively charged. When the plates are joined by a wire, electrons flow from the negative ⊖ plate to the other positive ⊕ plate. It was believed in the past that electricity flowed in a wire from ⊕ to ⊖, and this incorrect way of speaking is still used in speaking about electricity supply in (e.g.) houses.

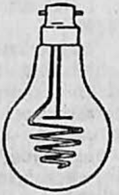
negative resistance – the property of parts of certain electric circuits in which the current increases rapidly while the voltage (pressure) needed to drive it decreases. Used to maintain electrical oscillations.

'nematocyst ('nemətosist) – a stinging cell of certain low forms of animal, e.g. ↓ hydra, jellyfish.

'Nematode worms ('nemətoud) – (*nema* = thread): group of worms, many parasitic, which includes round worms, thread worms, hook worms, found in the human bowel.

neo-/ (niio-) – ("new"): e.g. **'neo'lithic period** (= "new stone" period) – later part of the Stone Age when men made polished stone tools, about 10,000 years ago. ↓ /-lithic.

'neon ('niiɔn) – element; colourless gas, about 1 in 50,000 parts of the atmosphere. It does not react with other substances; used to fill the **'neon lamp** – glass tube with neon in it and two plates (or a plate and a coil): electricity flowing between the plates causes gas ions to strike against each other and give out red light. Similarly **neon signs** outside shops, etc.



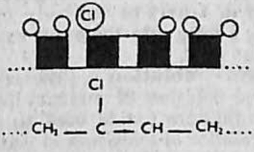
NEON LAMP

'neo'natal mortality ('niio'neitəl) – death of babies under one month old.

'neo'pallium ('niio'pæliəm) – ("new covering"): the newer part of the brain. In the brain of the earlier kinds of animals, smell was very important; as sight, hearing, fine muscular movement, and touch (to control such movement) developed, the neopallium developed. It deals with sight, hearing, touch and fine muscular control.

'neoplasm ('niioplæzm) – ("new formation"): a diseased growth (cancer).

'Neoprene ('niiopriin) – artificial rubber made from chloroprene (made from acetylene and hydrochloric acid); very widely used, e.g. for tubes, tyres, belts: (trade name).



$$\begin{array}{c}\mathrm{Cl}\\ |\\ \ldots\mathrm{CH_2}-\mathrm{C}=\mathrm{CH}-\mathrm{CH_2}\ldots\end{array}$$

NEOPRENE

'Neo'salvar'san (-'sælvə'sæn) – new form of salvarsan, a drug used to cure ↓ syphilis; ↓ **Novarsenobenzol**: (trade name).

'Neo'zoic period ('niio'zouik) – "new life" – a term sometimes used for the

↓ Cainozoic period or, occasionally, for the Cainozoic and ↓ Mesozoic periods together. (Contrast Palaeozoic.)

'neper ('niipə) – unit used (e.g. in calculations of electricity in the telephone) to express weakening of current or of sound energy; the weakening is calculated by ↓ Napierian logarithms; (neper – Napier).

neph-/ (nef-) – cloud. **'nepheline, 'nephelite** – cloudy white mineral (silicate of sodium and aluminium) found in igneous (heat-formed) rocks. **'nephograph** – instrument for photographing clouds. **'nephoscope** – instrument used in measuring cloud-speed and so wind-speed.

nephr-/ (nefr-) – kidney; e.g. **ne'phritis** – inflammation of the kidney. **ne'phrosis** – disease of the kidney.

nep'tunium (nep'tjuuniəm) – element formed from uranium. A neutron added to a heavy uranium atom (U238) produces U239; U239 sends out an electron and becomes neptunium. Neptunium sends out an electron and becomes plutonium: plutonium suffers fission (atom-splitting) as in the atom bomb.

ne'ritic zone (ni'ritik) – the part of the sea floor from the water's edge to a water-depth of about 600 feet.

Nernst heat theorem (nəənst -) – ↓ entropy.

nerve-block – loss of feeling of pain caused in a part of the body by injecting a drug into the nerve supplying that part.

'Nessler's solution ('nesləz) – alkaline solution of mercury iodide and potassium iodide used to show the presence of ammonia in water.

'netting index – Rubber and plastics are made up of very long chains of molecules with a certain number of cross-chains: the more cross-chains there are (high netting index) the more resistant to moisture the substance is.

'nettle rash – red and white raised spots in the skin, often caused by eating a protein (e.g. shell-fish) to which the body is ↓ allergic (to which the body reacts).

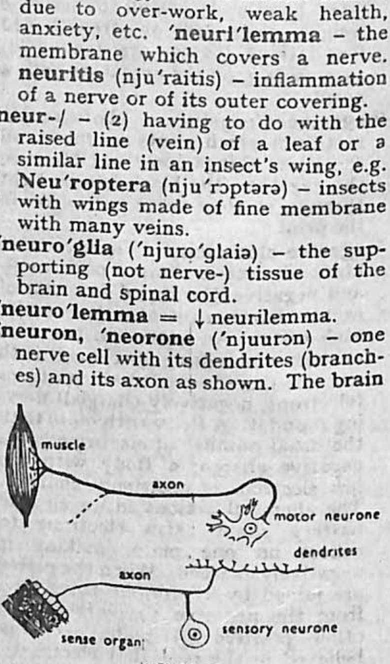
neur-/ (njur-) – (1) having to do with nerves, e.g. **neu'ralgia** (-'rældʒiə) – "nerve pain", a loose term for pain in the area of skin supplied by a certain nerve; it may be due to various causes. **'neuras'thenia** (-rəs'θiiniə) – "nerve weakness", loss of energy and of mental control due to over-work, weak health, anxiety, etc. **'neuri'lemma** – the membrane which covers a nerve. **neuritis** (nju'raitis) – inflammation of a nerve or of its outer covering.

neur-/ – (2) having to do with the raised line (vein) of a leaf or a similar line in an insect's wing, e.g. **Neu'roptera** (nju'rɔptərə) – insects with wings made of fine membrane with many veins.

'neuro'glia ('njuro'glaiə) – the supporting (not nerve-) tissue of the brain and spinal cord.

'neuro'lemma = ↓ neurilemma.

'neuron, 'neorone ('njuurɔn) – one nerve cell with its dendrites (branches) and its axon as shown. The brain and nervous system are built up of neurones.



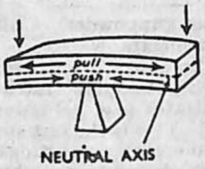
NEURONE

neu'rosis (nju'rousis) – mental disorder, caused by unpleasant experiences, resulting in anxiety (worry) which may produce signs of body disease; e.g. worry about hard work may produce a disordered action of the heart.

'neuter ('njuutə) – sex-less, e.g. worker ants.

'neutral ('njuutrəl) – having no colour; grey; not electrically positive ⊕ nor negative ⊖; not acid and not alkaline.

'neutral 'axis – When a beam is bent



down (e.g. as shown) there is a pull on one side and a push on the other side; the neutral axis (where there is neither push nor pull) lies in between.

'neutral equi'librium – ↓equilibrium.

neu'trino (njuu'triinou) – particle with very small mass and no electric charge believed to be produced by the splitting of a ↓meson.

'neutron ('njuutrɔn) – a particle, neither ⊕ nor ⊖, which forms part of the nucleus of an atom. The atom of hydrogen consists of 1 proton (the nucleus) with 1 electron moving round it; the nucleus of an atom of heavy hydrogen consists of 1 proton + 1 neutron. The mass of a neutron is about 1% greater than that of a proton.

'névé ('neve) – hard mass of snow-ice crystals high up on a mountain (above summer melting line).

newsprint – cheap paper in rolls as for newspapers.

'newton ('njuutən) – unit of force in the ↓M.K.S. system; the force which causes a mass of 1 kilogramme (1,000 grammes) to gain speed at the rate of one metre per second in each second.

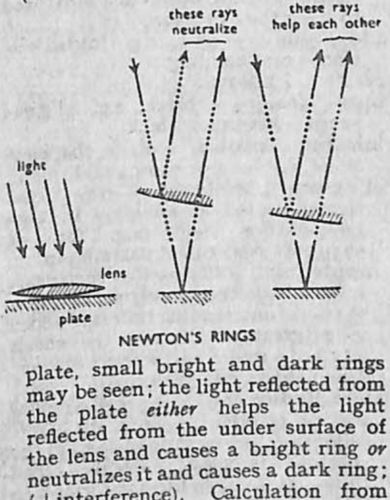
new'tonian 'telescope – telescope in which one looks through a lens in the side of the tube at an image of the star formed by a curved (concave) mirror.

Newton's disc – round plate with colours of the spectrum painted on it in such proportions that, when the disc (plate) is turned round very quickly, it seems white.

Newton's law of cooling – The rate of cooling of a hot Body is proportional to its temperature above the objects, air, etc., round it. Thus, if it cools at a rate of 6° per minute when it is 30° hotter than the (air), it cools at a rate of 3° per minute when it is 15° hotter than the (air). The law is not exact, especially if the Body is much hotter than the objects round it.

Newton's laws of motion – (1) A Body changes its motion only as a result of force. (Unless some force is used on it, a body in motion goes on moving at the same speed and in the same direction, and a body not in motion stays motionless (2) The rate of change of movement (↓momentum) is proportional to the force: the direction of change is in the direction of the force. (3) The action and reaction (back-action) are equal and opposite; e.g. a table presses upon a book as much as the book presses down on the table; so also the forward force (momentum) of a bullet from gun and the backward "kick" of gun. ↓reaction, ↓recoil.

Newton's rings – If a slightly convex (outward curve) lens is laid on a flat plate, small bright and dark rings may be seen; the light reflected from the plate *either* helps the light reflected from the under surface of the lens and causes a bright ring *or* neutralizes it and causes a dark ring; (↓interference). Calculation from the known curvature of the lens and the width of the rings gives the wavelength of the light. (English, 1642–1727.)



NEWTON'S RINGS

Ni – chemical sign for ↓nickel.

'niacin ('naiəsin) – name for ↓nicotinic acid (U.S.A.).

'niccolite ('nikəlait) – important ore of nickel, consisting chiefly of nickel arsenide. Also called 'kupfernickel.

'Nichrome ('naikroum) – trade name for nickel-chromium alloys. They can bear much heating without being damaged. Used e.g. for the wire of electric heaters in houses.

'nickel (nikl) – white metal element (rather like silver but more blue), used for plating (e.g. bicycles), also in alloys.

nickel-iron-alkaline accumulator – ↓ Edison.

'Nicol prism ('nikl) – specially cut crystal of Iceland spar used to *polarize light: *(cause all the light waves to lie parallel to each other).

'nicotine ('nikətiin) – the poisonous substance in tobacco. ↓ alkaloid.

'nico'tinic acid ('niko'tinik -) – part of the B group of vitamins; lack of it causes ↓ pellagra.

'nicti'tating membrane ('nikti-'teitiŋ -) – third eyelid of a bird, used to keep the eye clean.

nid-/ (nid-) – nest, e.g. **'nidifi'cation** – nest building.

Ni Fe – ↓ Edison.

nigr-/ (naigr-) – black, e.g. **ni'grescent** – becoming black.

'nimbus ('nimbəs) – dark shapeless cloud, e.g. rain or snow cloud.

ni'obium (nai'obiəm) – grey metal element, used as an alloy in high temperature steel (e.g. for jet engines). Also called columbium.

'nipple (nipl) – the part of the breast from which the young sucks milk; the small outstanding tube into which oil or grease is driven in the wheels (etc.) of a motor car; a short screwed pipe used to join gas pipes.

Nissl Bodies (nisl -) – small angular masses (protein + iron) in nerve cells: they can be stained deeply: the substance is probably evenly spread through the cell in life and forms into masses only as a result of chemical action.

'nitramines ('naitræmiinz) – = nitro-amines. Amines = substances formed from ammonia, NH_3; e.g. methyl amine, CH_3NH_2: in the nitramine a further H atom is replaced by NO_2 (nitro-group); methyl nitramine, $CH_3.NH.NO_2$. ↓ nitro compounds.

'nitrates ('naitreits) – salts of nitric acid HNO_3, e.g. potassium nitrate, KNO_3 = **nitre** ('naitə) = saltpetre (used in making gunpowder). **Chile nitre** – sodium nitrate, $NaNO_3$.

ni'tration (nai'treiʃən) – changing nitrites (e.g. potassium nitrite, KNO_2) into nitrates (e.g. potassium nitrate, KNO_3). This is the last step in **nitrification** – changing nitrogen compounds (e.g. from dead plants) into nitrates, done by bacteria in the soil. ↓ nitrogen cycle.

nitre – ↓ nitrates.

'nitric acid ('naitrik) – HNO_3.

'nitric oxide – colourless gas, NO. With air or oxygen it forms **nitrogen peroxide** (NO_2), a brown smoke-like vapour.

'nitride ('naitraid) – compound of a metal and nitrogen. **ni'triding** – hardening the surface of steel by passing ammonia gas (NH_3) over it.

'nitrifi'cation – (1) nitration; (2) treating with nitric acid.

'nitrifying bac'teria – bacteria in the soil (especially in the roots of pea/bean plants) which form nitrates from nitrogen in the air.

'nitrile ('naitrail) – older name for a cyanide (–CN) of a hydrocarbon radical (root), that is, R.C⋮N. Ex-. ample: methane CH_4, methyl radical CH_3–, methyl cyanide = acetonitrile = CH_3CN.

'nitrites – salts of nitrous acid, e.g. sodium nitrite, $NaNO_2$: amyl nitrite, ethyl nitrite, sodium nitrite are used, in disorders of the heart, to dilate (open wide) the blood vessels, thus easing the work of the heart.

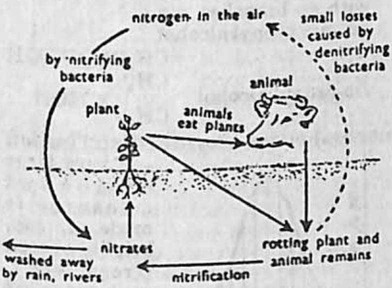
'nitro'benzene – ↓ nitro-compounds.

'nitro-chalk – ammonium nitrate + calcium carbonate, fertilizer used by farmers; it acts very quickly. It is used on the top of the soil to hurry early spring growth, e.g. of grass.

'nitro-'celluloses – compounds formed by the action of nitric acid and sulphuric acid on cellulose. Nitrocelluloses with a small proportion of nitrate groups are used in the making of ↓ lacquers and artificial silks; those with a higher proportion of nitrate groups are explosive (= guncotton).

'nitro-compounds – compounds containing the group $-NO_2$, e.g. nitrobenzene $C_6H_5NO_2$ (used to make aniline for dyes, also for scents). ↓nitroso compounds.

'nitrogen ('naitrədʒən) – element; a gas, forming 75% (weight), 78% (volume) of the atmosphere. **nitrogen cycle** – the changes in nitrogen compounds and the movements of nitrogen compounds caused by plants, animals and bacteria.


nitrogen in the air
small losses caused by denitrifying bacteria
by nitrifying bacteria
animal
plant
animals eat plants
nitrates
rotting plant and animal remains
washed away by rain, rivers
nitrification

NITROGEN CYCLE

'nitrogen fi'xation – combining nitrogen gas from the air into a compound, e.g. combining nitrogen and oxygen by means of an electric spark into ↓nitric oxide, or combining nitrogen and hydrogen (with the help of a *catalyst) to form ammonia: *(substance which causes chemical change without itself being changed). ↓nitration.

ni'trogenous foods (nai'trɔdʒinəs-) – Proteins contain about 15% nitrogen. Nitrogenous foods are foods containing a large proportion of proteins, e.g. meat (15–20% protein and gelatin); fish (about 10%); also cheese, milk, beans.

'nitro'glycerine ('naitro'glisəriin) – explosive made by the action of nitric acid and sulphuric acid on glycerine.

'nitrohydro'chloric acid – = aqua regia, 1 part strong nitric acid + 4 parts strong hydrochloric acid; it dissolves gold. As a medicine (very dilute with water) it is used for weak digestion and liver disorder.

'nitro-lime – calcium cyanamide, weed killer when put on the surface; fertilizer when worked into the soil one week before sowing.

ni'troso-compounds (nai'trousou -) – compounds containing the nitroso-group, –NO, e.g. nitrosobenzene C_6H_5NO; nitroso compounds are used especially in dyes.

'nitrous acid – HNO_2: the salts of nitrous acid are nitrites, e.g. sodium nitrite, $NaNO_2$.

'nitrous oxide – N_2O, "laughing gas" as used by a dentist to cause unconsciousness when pulling out a tooth.

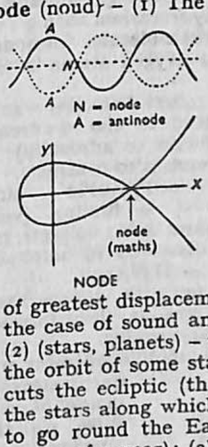
niv-/ – snow, e.g. **'niveous** ('niviəs) – snowy.

noble metals – gold, silver, platinum, etc., which are not attacked by ordinary acids; opposite of base metals.

noci-/ (nɔsi-) – hurt, harm. **'noci'ceptive reflex** – an unconscious action (e.g. shutting eyes) which protects from harm.

noct-/ (nɔkt-) – night, e.g. **noc'tambulation** – sleep-walking. **noc'turnal** – during the night.

node (noud) – (1) The diagram shows a vibrating string: the *N*odes are the points of least displacement (least movement away from the straight line of the string when not vibrating): the *A*ntinodes are the points of greatest displacement. So also in the case of sound and radio waves; (2) (stars, planets) – the point where the orbit of some star (planet, etc.) cuts the ecliptic (the path through the stars along which the sun *seems* to go round the Earth during the course of a year); (3) (maths.) point where the two branches of a curve cross at an angle; (4) (plant) – joint on the stem, e.g. of grass, bamboo, etc. where a leaf joins.

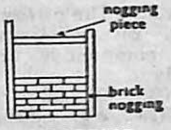


NODE

'nodule ('nɔdjul) – a small swelling, e.g. the nodules on the root of a bean in which nitrogen-fixing bacteria live.

nog (nɔg) – wooden brick.

'nogging – filling spaces between



NOGGING

wooden beams in a partition (wall) with bricks.

noise (radio) – chance, meaningless and usually unwanted signals (e.g. hums and crackles) in a radio receiver. **signal-to-noise ratio** – the power (strength) of the wanted signal compared with the power of the unwanted noise. If the ratio is too small the signal cannot be understood.

no'menclature (nou'menklətiuə) – system of naming.

no'mography (nɔ'mɔgrəfi) – system of representing equations of up to six variables (*x*, *y*, *z*, etc.) by means of **nomograms** (mathematical drawings) from which various values (e.g. for *x*) can be read.

non- (nɔn-) – not, e.g. **non-bearing** wall = wall carrying no weight on it.

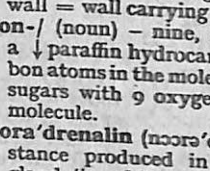
non-/ (noun) – nine, e.g. **'nonane** – a ↓ paraffin hydrocarbon with 9 carbon atoms in the molecule. **'nonoses** sugars with 9 oxygen atoms in the molecule.

nora'drenalin (nɔɔrə'driinəlin) – substance produced in the ↓ adrenal gland (in addition to adrenalin); it causes blood vessels to contract.

'Nordhausen sul'phuric acid ('nɔɔdhauzən -) – fuming (very strong) sulphuric acid; sulphur trioxide (SO_3) dissolved in sulphuric acid (H_2SO_4) = $H_2S_2O_7$.

no'ritic rock (nɔ'ritik -) – a basic ("alkaline") igneous (heat-formed) rock, with coarse grains.

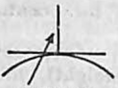
norm (nɔɔm) – middle or most frequent measure in a set of measures, e.g. the average score in a certain test of all the children of a certain age.



NORM

'normal, adj. – usual, e.g. normal temperature of the body, 98·4° F.; (of the mind) healthy, like other people.

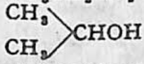
'normal (line) – a line drawn perpendicular (at right angles) to another straight line or to a tangent (line touching a curve); so also to a surface.



NORMAL

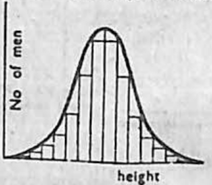
normal (chemistry) – having a chain of carbon atoms with no branches, e.g. normal propyl alcohol $CH_3CH_2CH_2OH$

iso-propyl alcohol



$$\begin{matrix}CH_3\\CH_3\end{matrix}\Big\rangle CHOH$$

normal curve, normal distri'bution – A very large number of measures is made of, e.g., heights of men (trees, etc.), measures of intelligence (strength, etc.); a graph is drawn to show the number of times each measure occurs, i.e. to show the distribution of the measures. The bell-shaped curve so obtained (which can be exactly described in mathematical terms) is a **normal distribution curve.** The curve is the same as that obtained if a very large number of coins is thrown up a very large number of times and the number of heads and tails is noted each time. ↓ Pascal's triangle, Gaussian.



NORMAL CURVE

'normalizing steel – heating and then cooling steel so as to produce very fine crystals and to ease the forces pulling and pushing inside the substance due to irregular cooling.

normal salts – salts in which all the hydrogen atoms in an acid are replaced by a metal, e.g. sodium sulphate (Na_2SO_4) but not sodium bisulphate ($NaHSO_4$).

normal solution – the gramme ↓ equivalent weight of a substance dissolved to make 1 litre of solution; e.g. the molecular weight of sulphuric acid is 98; the equivalent weight (containing 1 part of hydrogen) is 49. A normal solution of sulphuric acid is such that 1 litre contains 49 grammes of pure acid.

NORMAN ARCHITECTURE

'Norman (architecture) – way of building with round arches as shown.

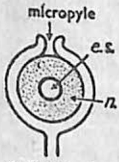
no'sology (nɔ'sɔlɔdʒi) – classification (arrangement in classes) of diseases.

noto-/ (nouto-) – back, e.g. **'notochord** – elastic rod which serves in place of a spine in the simpler, earlier kinds of ↓chordate animals, e.g. the ↓amphioxus.

'nova ('nouvə) – a faint star which becomes bright for a few days, then faint again. It is a giant star which has used up its hydrogen and is becoming smaller. Five novae were seen in 1900–35. ↓supernova.

No'varseno'benzol (nouv'aasəno'benzɔl) – = neosal'varsan 914, drug used to cure ↓syphilis; it is more soluble and less painful when injected than salvarsan: (trade name).

'Novocain(e) ('nɔvokein) – drug similar in action to cocaine used e.g. for injection at the root of a tooth to prevent pain: (trade name).



ovule showing NUCELLUS

nu'cellus (nju'seləs) – ("small nucleus"): mass of thin-walled cells in an ovule (seed before fertilization) within which is the embryo sac (hollow containing protoplasm and nuclei): *n* in the diagram shows nucellus; *e.s.* = embryo sac.

'nucha ('njuukə) – back of the neck.

'nuclear ('njuukliə) – of a nucleus (of a cell or an atom). **'nucleate**–having a nucleus. **'nuclei** ('njuukli.ai) – plural of nucleus.

'nu'cleic acids ('njuu'klei.ik-) – complicated acids, built up in long chains from **nucleotides** (units containing a sugar, a phosphate group and a nitrogen group), found in cell nuclei. ↓desoxyribonucleic acid, ribonucleic acid. **nucleoside** – a nucleotide from which the phosphate group has been removed.

nucleo-protein – a protein combined with a nucleic acid; the nuclei of living cells contain nucleo-proteins.

nu'cleolus – the nucleus of a nucleus, a dense Body inside a nucleus.

'nucleon – a particle in the nucleus of an atom; general name for a proton or a neutron.

'nucleus – the central part of a living cell on which the life of the cell depends. When the nucleus divides into two, the cell divides and becomes two cells.

'nucleus (of atom) – the central (⊕) part of an atom: it consists of protons and neutrons, round which the ⊖ electrons move. (In the nucleus of a hydrogen atom there is only one proton (and no neutron).)

nu'dation (nju'deiʃən) – causing an area to have no plants on it.

null (nʌl) – no, none. **null method** – method of measuring by balancing one quantity against another so that the measuring instrument shows 0 (zero), e.g. weighing with a chemical balance but not with a spring balance. **nullipara** (nʌ'lipərə) – a woman who has had no children.

nu'tation (nju'teiʃən) – (1) nodding (moving the head up and down): movement of the pole of the Earth such that it travels in a wavy, not straight, curve – caused by the pull of the moon (and sun) on the equator; (2) the turning round movement of the growing point of a plant.

'nux 'vomica ('nʌks-'vɔmikə) – seed from which the drug ↓strychnine is obtained.

nyct-/ (nikt-) – night, e.g. **'nycta'lopia** – night blindness; not being able to see in weak light. **nyct'anthous** – having flowers which open only at night.

'nylon ('nailɔn) – class of ↓polymerized amides (nitrogen compounds) made (e.g.) from adipic acid; the fibre is used for artificial silk stockings, dress materials, etc.

nymph (nimf) – young insect which differs very little from the fully grown form: water-living form of dragon-fly.

nys'tagmus (nis'tægməs) – to and fro movement of the eyes, due to faulty eyesight or a nervous disease.

O

O – (1) chemical sign for oxygen; (2) ↓ortho.

o'belia (o'biiliə) – fresh-water creature which starts as a 'polyp('pɔlip) (plant-like form). A bud grows on the stem and develops into a new polyp. In this way a thing like a very small tree covered with polyps is formed. The polyp has a mouth which helps to feed the whole "tree". The lower branches do not bear polyps, but medusae (small "jelly-fish" which swim away and develop into new obelias).

OBELIA

o'besity (o'biisiti) – medical word for fatness.

'object glass, ob'jective (of a microscope or telescope) – the lens nearest the thing being looked at.

ob'late (ɔb'leit) (sphere) – not quite round but slightly flattened, e.g. like an orange.

'obligate ('ɔbligeit) – forced to be, not able to live in any other way, e.g. **obligate parasite**; opposite of facultative (able to choose).

ob'lique system of crystals (o'bliik) = ↓monoclinic.

ob'session (ɔb'seʃən) – fixed idea which cannot be got out of the mind.

ob'sidian (ɔb'sidiən) – black or green glass formed in a volcano.

obs'tetrics (ɔbs'tetriks) – that part of medicine which deals with child-bearing.

'obturator ('ɔbtjureitə) – thing which closes up a hole; thing used to prevent backward escape of gas when a gun is fired.

ob'tuse (ɔb'tjuus) – blunt; not sharp. **obtuse angle** – greater than a right angle.

'occiput ('ɔksipət) – the back of the head.

oc'clusion (ɔ'kluuʒən) – blocking up a hole so that (liquid) cannot pass; holding in of gas in a liquid or solid, e.g. a bubble in a metal casting: (weather) forcing up of a mass of warm air from the surface of the Earth by a "cold front" (flow of cold air) which moves faster than the warm front, overtakes it and flows in under it; the edge of this forced-up air is an **occluded front.**

'occul'tation ('ɔkʌl'teiʃən) – hiding of stars and planets by the moon; hiding of satellites (moons) of a planet by the planet.

o'cellus (ɔ'seləs) – small simple form of eye consisting of a lens sunk in the skin with light-sensitive substance behind it; small coloured spot, e.g. on a leaf or on a butterfly's wing.

'ochre ('oukə) – yellow-brown earth used in paint.

octa-/ (ɔktə-) – eight. **'octa'hedron** (-hiidrɔn) – 8-sided solid. **octane** – a ↓paraffin hydrocarbon with 8 carton atoms in its molecule. **'octane number, octane rating** ('ɔktein) – a measure of the *"knocking" quality of petrol: *(tendency to explode suddenly upwards and sideways causing a "ping-ping" sound in a motor engine instead of exploding slowly downwards so as to drive the engine). **heptane** (7 carbon petrol) is very bad in this respect; its number is 0: **iso-octane** is very good, its number is 100. A rating of 80 means that the petrol being tested is equal (as regards knocking) to a mixture of 80 parts iso-octane and 20 parts heptane.

'octa'hedral system of crystals ('ɔktə'hiidrəl) – ↓cubic.

'octant ('ɔktənt) – instrument like a ↓sextant (for measuring angles, e.g. of the sun); an octant measures angles up to 90°. **octant division** of a cell – division to form 8 new cells.

'octopod ('ɔktopɔd) – eight-limbed creature, e.g. the **octopus.**

OCTOPOD

'ocul-/ ('ɔkjul-) – eye, e.g. **'ocular,** adj. **'oculist** – eye doctor.

/-ode (-oud) – an ending used in the names of electrodes and radio valves, e.g. **e'lectrode** – plate or wire by which electricity is led into or out of a liquid (as in ↓electrolysis) or into or out of a gas or near-vacuum (as in a radio valve). **'cathode** ('kæθoud) – the ⊖ (negative) plate. **'anode** ('ænoud) – the ⊕ (positive) plate. **'diode** ('daioud) – a radio valve with 2 electrodes. **triode** ('traioud) – a radio valve with 3 electrodes. So also **tetrode** (4), **pentode** (5), etc.

o'dometer (ɔ'dɔmitə) – instrument for measuring a distance travelled, e.g. for recording the length of wire used in measuring sea-depth.

'Odo'nata ('ɔdo'neitə) – group of insects which includes dragon-flies.

ODONATA

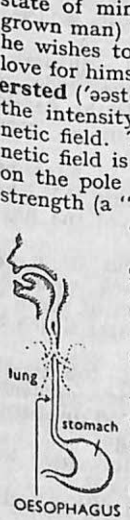
o'dont-/ (ɔ'dɔnt-) – tooth, e.g. **odontic**, adj. **odontoid** – like a tooth.

/-'oecious (-'iisiəs) – living in . . ., e.g. **'heter'oecious parasite** – parasite which lives on different hosts at different stages of its life.

oe'dema (ii'diima) – swelling (of a part of the body) due to collection of liquid in the tissues.

'Oedipus complex ('iidipəs –) – a state of mind in which a boy (or grown man) hates his father because he wishes to have all the mother's love for himself.

'oersted ('əəsted) – unit for measuring the intensity (strength) of a magnetic field. The strength of a magnetic field is one oersted if its force on the pole of a magnet of certain strength (a "unit magnetic pole") is one ↓dyne.



OESOPHAGUS

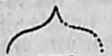
oe'sophagus (ii'sɔfəgəs) – the food-pipe leading from the pharynx (at the back of the mouth) down into the stomach.

'oestrus ('iistrəs) – the time of sexual desire in a female when the female is "on heat". **'oestrogens** ('iistrodʒenz) – substances (internal secretions) produced by the ↓ovary; they cause the changes found in the body during the oestrus – building up of the lining of the uterus (reproduction organ), growth of breast-glands, etc. – and the development of female characteristics.

'offset – cross measurement at right angles to a main measurement in map-making.

offset printing – way of printing pictures on rough surface paper; the picture is printed on soft rubber (or similar substance) and from the rubber on to the paper.

'ogee ('oudʒii) – double curve as shown; an arch made of 2 such curves.


OGEE

ohm (oum) – unit for measuring electrical resistance. A conductor has a resistance of 1 ohm if 1 ampere flows through it when a pressure of 1 volt acts. The resistance of the wire inside a lamp in a house is about 400–700 ohms.

Ohm's law – The current which flows through a conductor is proportional to the difference of pressure (voltage) between its ends; e.g. if 1 ampere flows when the pressure is 2 volts, 2 amps. flow if the pressure is 4 volts; 3 amps. flow if the pressure is 6 volts, etc. Thus pressure ÷ current always comes to the same number for a certain conductor. This number is called the resistance of the conductor.

So $\frac{\text{pressure (in volts)}}{\text{current (in amps.)}} = \begin{matrix}\text{resistance}\\ \text{(in ohms).}\end{matrix}$

/-oid (-ɔid) – (1) like a, e.g. **o'dontoid** – like a tooth; (2) a solid figure formed by revolving a flat figure, e.g. a parabola, **pa'raboloid**; ellipse, **e'llipsoid.**

o'idia (ou'idiə) – fungus spores formed in a chain in a branching tube-like outgrowth.

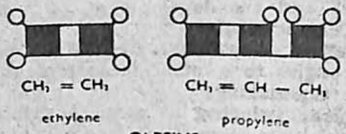
/-ol (-ɔl) – an alcohol (a hydrocarbon with one or more –OH groups), e.g. methanol (methyl alcohol) CH_3OH, glycol $HOCH_2.CH_2.OH$, phenol C_6H_5OH.

/-ole – small, e.g. **arteriole** – very small artery; **vacuole** – small space or cavity, usually containing liquid, in the protoplasm of a cell.

o'lecranon (ou'lekrənɔn) – the point of the elbow-bone.

'olefiant gas – ↓ethylene.

'olefins ('oulifiinz) – hydrocarbons of the ↓ethylene kind, containing twice as many hydrogen atoms as carbon atoms and a double bond (join between carbon atoms). The simpler olefins are gases; the more complicated ones are liquids; the longest olefin molecules form waxy solids. They are found in petroleum, and are used for burning and for making alcohols: see also glycol.



OLEFINS

o'leic acid (o'lii.ik) – commonest of those acids which, combined with glycerine, form fat, e.g. in milk, olive oil and meat fat.

'oleo-/- ('ouliou-) – oil, e.g. **'oleocyst** – oil-containing organ. **oleoresin** – ↓resin.

ol'factory (ɔl'fæktəri) – having to do with smell, e.g. **olfactory organ** = nose.

'olig-/-o-/ – few, little e.g. **'oli'guria** (ɔli'gjuuriə) – passing little urine.

'Oligo'cene period ('ɔligo'siin) – The Cainozoic era ("recent life") is the age (in the history of the Earth) in which the newer (modern) forms of life are found. It is divided into 7 periods, of which Oligocene is the 3rd. The Oligocene ("slightly new") period was about 35–45 million years ago; early forms of the pig, camel, horse, cat (etc.) are found in Oligocene rocks.

'olivine ('ɔliviin) – orthosilicate of iron and magnesium $(MgFe)_2 . SiO_4$. Found chiefly in "sima" (deep-seated rocks, ocean floor, under the lighter "sial" rocks of the land). The clear crystal olivine is the jewel peridot. Rock in which olivine is the chief mineral is called peridotite.

/-'oma (-'oumə) – tumour (diseased growth) e.g. **fibroma** – a tumour composed of fibre; **lipoma** – tumour composed of fat; **myoma**– of muscle; **neuroma** – of nerve.

o'masum (o'meisəm) – 3rd stomach of a cow: the ↓'abomasum is the 4th (the true stomach).

ombr-/-o-/ (ɔmbr-) – rain, e.g. **om'brometer** – rain gauge (rain measurer).

o'mentum (o'mentəm) – a membrane covered with fat which hangs down in front of the bowels: thickening of the omentum causes the outstanding "stomach" of fat people.

om'nivorous (ɔm'nivərəs) – eating all (vegetable and flesh) food, e.g. as by rats, but not cows or lions.

'omphal-/-o-/ ('ɔmfəl) – having to do with the navel (= umbilicus = small hollow in the centre of the front of the body where the baby was joined to the mother).

/-on (-ɔn) – an ending used for the names of particles (e.g. electron, proton, neutron) and of instruments for producing high-speed particles (e.g. cyclotron).

/-on (-ɔn) (chemistry) – an ending used for the name of a rare gas which does not combine with other elements, e.g. neon, argon, xenon, krypton.

'oncho-/ ('ɔŋko-) – hook, e.g. **onchocerci'asis** – infection of the skin tissue caused by a parasitic (nematode) worm, **onchocerca,** which has a hook.

on'togeny (ɔn'tɔdʒəni) – history of the development of the single creature; (phylogeny tells the development of the phylum = group, family).

o'nych-/-o-/' (ɔ'nik-) – finger-nail, e.g. **o'nychogry'phosis** – thickening and over-growth of the finger-nails.

'onyx (ɔniks) – precious stone with straight bands of black, white and red in it; it is a form of agate (an impure form of ↓quartz which has colours in it).

oö-/ (ou.o-) – egg, e.g. **'oö'genesis** ('ouo'dʒenesis) – the development of female ova (eggs). **'oö'gonium** – female organ of a fungus.

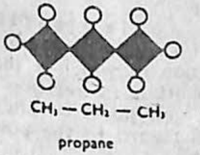
'oölite (ou.olait) – a limestone with large, egg-like grains in it.

'Oömy'cetes ('ou.omai'siitiiz) – class of fungus (one of the 2 divisions of the Phycomycetes). It includes the fungus causing Potato disease and that which causes young plants of lettuce, melon, cucumber, etc. to fall over and rot.

'oösphere – unfertilized female cell of a fungus. **oöspore** – fertilized female cell, e.g. of a fungus.

'opal ('oupəl) – precious stone, which looks like milky water with colours in it. **'opa'lescent** – like an opal.

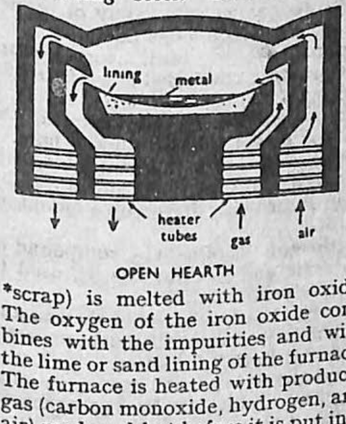
open chain compounds – carbon compounds in which the carbon atoms are joined in a row (not in a ring), e.g. propane (but not benzene).



OPEN CHAIN COMPOUND

open circuit – electric circuit with a break (unjoined part) in it so that the current cannot flow.

open hearth process (- haaθ -) – way of making steel. Cast iron (and *scrap) is melted with iron oxide. The oxygen of the iron oxide combines with the impurities and with the lime or sand lining of the furnace. The furnace is heated with producer gas (carbon monoxide, hydrogen, and air) made red-hot before it is put into the furnace. This heating is done below the hearth (metal container) using the heat of the furnace itself: *(broken pieces of used iron or steel).



OPEN HEARTH

open shedding – way of weaving with the two sets of long threads (warp) separated with a space between: only those threads which need to be moved are pulled down (or up) for the shuttle (container carrying the cross-thread) to pass between.

operational research (O.R.) – study of military or industrial operations, processes, etc. by scientific and mathematical methods.

o'perculum (ɔ'pəəkjuləm) – lid or covering which can be opened and shut, e.g. in the spore-container of a fungus; cover of gills (breathing organ) of fish; the shell-door of a snail.

'ophi-/ ('ofi-) – snake, e.g. **'ophi'cephalous** – with a snake-like head.

oph'thalm-/-o-/ (ɔf'θælm-) – eye, e.g. **oph'thalmia** – disease of the eye-ball. **oph'thalmoscope** – instrument for examining eyes.

'opiate ('oupiət) – sleep-producing drug, e.g. **opium** (drug obtained from poppies).

o'pistho-/ (o'pisθo-/) – behind, back, backwards, e.g. **o'pistho'glossal** – with the tongue free at the back, fixed in front, as in frogs. **'opis'thotonus** – bending of the body backwards by contraction of the muscles as in a seizure, ↓ tetanus or poisoning, e.g. with strychnine.

'oppo'sition – A planet is in opposition when the planet, Earth and sun are in a straight line, with the planet and the sun on opposite sides of the Earth.

'opsonins ('ɔpsəninz) – substances in the blood which act on bacteria so that the white cells of the blood attack the bacteria more readily. **op'sonic index** – a figure showing the power of the blood of a certain person in attacking a certain class of bacteria: vaccines increase the opsonic index.

'optic ('ɔptik) – of sight, e.g. **optic nerve.**

optic axis – direction through a crystal along which a ray of light is *not* divided into two parts.

'optical activity – power of twisting ↓ polarized light.

'optics – the scientific study of light.

'optimum ('ɔptiməm) – best, e.g. **optimum temperature** – temperature most suitable for a certain creature (or for a certain chemical process).

o'ral ('ɔɔrəl) – of the mouth.

or'bicular (ɔɔ'bikjulə) – flat with a circular edge.

'orbit ('ɔɔbit) – (1) path of one Body which travels round another, e.g. the path of the Moon or of an artificial ↓satellite round the Earth, of an electron round the nucleus of an atom. (2) the hollow (in the skull) in which the eye is set.

orch-/-i-/ – of the testicles (two male sex organs). e.g. **or'chitis** (ɔɔ'kaitis) – inflammation of the testicles.

'ordinate ('ɔɔdineit) – vertical (upright) line of measurement in a graph. ↓abscissa: *PM* is the ordinate.

'ordnance ('ɔɔdnəns) – all kinds of big guns. **'Ordnance 'Survey De'partment** – Government office which produces maps of Britain.

'Ordo'vician ('ɔɔdo'viʃiən) – middle part of the lower ↓Palaeozoic age, from about 420 to 350 million years ago.

'organ – part of a (living) body which does some special work, e.g. heart, brain, leaf, root.

or'gandie (ɔɔ'gændi) – light, transparent, stiff cotton dress-material.

or'ganic (ɔɔ'gænik) – of an organ, e.g. organic disease = disease of an organ of the body.

or'ganic chemistry – (originally) the study of the chemical compounds found in living matter and which, it was thought, could only be produced by living matter; (now) the chemistry of the compounds of carbon (though a few simple compounds, e.g. carbon dioxide, are usually included in inorganic chemistry).

'organism ('ɔɔgənizm) – a living thing, e.g. a man is a complicated organism; an amoeba is a one-celled organism.

'organizer (in development of an egg) – chemical substance which stimulates (causes to begin) the formation of different kinds of cells from the fertilized egg.

'organo-/ ('ɔɔgæno-) – organic compound, e.g. **organo-metallic compound** – compound of a metal with a group of atoms containing carbon. **'organo'sol** – ↓colloidal solution in which the liquid is an organic (carbon) compound.

'organo'therapy (-'θerəpi) – medical treatment by injecting extracts from animal glands, e.g. extract of ↓thyroid gland.

'orgasm ('ɔɔgæzm) – excitement, e.g. sexual excitement.

'oriel window ('ɔɔriəl -) – window standing out from a wall and held up by supports (brackets) built into the wall (not by pillars or a lower wall).

ORIEL WINDOW

'orien'tation ('ɔɔrien'teiʃən) – direction in which a thing points; its position in relation to other things: (air-pilot) – finding his position in regard to the points of the compass.

/-'orium (-'ɔɔriəm) – place in which something is done, e.g. **'audi'torium** – hall in which people sit to listen to (e.g.) music. **'crema'torium** – place in which bodies are cremated (burned).

'ormolu ('ɔɔməluu) – alloy of copper and zinc which looks like gold.

ornith-/-o-/ – bird, e.g. **'orni'thology** ('ɔɔni'θɔledʒi) – the study of birds.

'oro-/ ('ɔɔrou-) – of the mouth, e.g. **'oro-'nasal** – of mouth and nose.

'oro-/ ('ɔrou-) – of mountains, e.g. **'oro'graphic rain** – rain caused by moist air being driven up a mountain side.

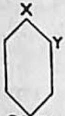
'orpiment ('ɔɔpiment) – compound of arsenic and sulphur, As_2S_3, used to make yellow paint.

'orrery ('ɔrəri) – model of the sun and planets in which all move correctly when a handle is turned.

'orthicon – television camera similar to an ↓Emitron. **Image orthicon** – similar to a Super-Emitron.

'ortho-/ ('ɔɔθou-) – (1) straight, correct, e.g. **'orthochro'matic films** – photographic films which show colours in the same brightness as they seem to the eye (e.g. blue not too bright; red not too dark); (2) at right angles, e.g. ↓orthoclase, orthogonal.

'ortho-/ (chemistry) – (1) **ortho-acid** – acid consisting of an oxide joined with the greatest number of water molecules; see meta (2); (2) **ortho-compounds** – compounds containing two groups joined to carbon atoms which are next to each other in a benzene ring.



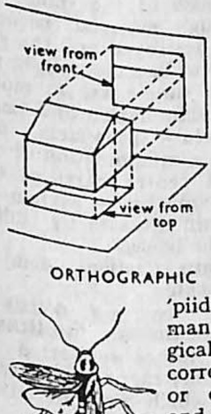
ORTHO-/

'orthoclase ('ɔɔθoukleiz) – a ↓feldspar mineral consisting of silicates of aluminium and potassium. Its crystals split in two directions at right angles.

,ortho'dontic – having to do with the proper growth and development of teeth (not with the repair or removal of diseased teeth).

or'thogonal (ɔɔ'θɔgənəl) – at right angles, e.g. "cutting each other orthogonally."

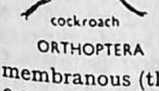
,ortho'graphic projection ('ɔɔθo-'græfik -) – way of drawing a solid thing (e.g. a house) to show the views from the top, front, etc., as shown in the diagram.



ORTHOGRAPHIC

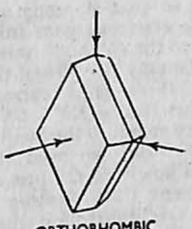
'ortho-'paedic surgeon ('ɔɔθo-'piidik) – medical man who does surgical operations to correct mis-shapen or damaged bones and joints.

Or'thoptera (ɔɔ'θɔptərə) – insects in which the first pair of wings is thick and the second pair membranous (thin like a membrane), e.g. cockroach, earwig, grasshopper.



ORTHOPTERA

,ortho'rhombic crystal system ('ɔɔθou'rɔmbik) – A crystal of this shape has 3 unequal "axes" (middle lines) at right angles. The crystal can be turned through 180° about an axis and then its corners, edges and faces come into the same positions. Examples, Epsom salts, topaz, barytes.



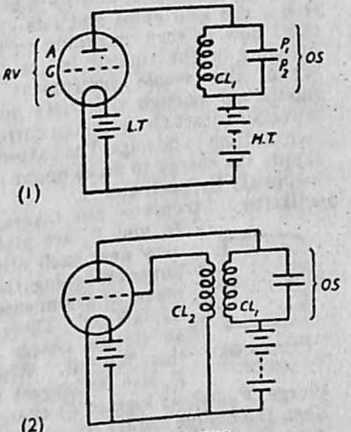
ORTHORHOMBIC

Os – chemical sign for ↓osmium

os (ɔs) – bone, e.g. **os calcis** – the heel bone.

'oscillate ('ɔsileit) – swing backward and forwards. **'oscillating current** – alternating current in which there are many hundreds or thousands of cycles (swings) per second.

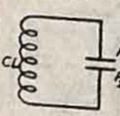
'oscillator – instrument for producing oscillating (swinging) electric current, e.g. for radio sending or for a radio set which uses the ↓heterodyne effect. An oscillator is an oscillatory circuit (see just below) in which the swing of electricity to and fro is kept going by feeding in more electricity just at the right moment from outside. The diagram shows one of many possible arrangements. In diagram (1) the coil CL_1 and plates P_1P_2 form the oscillatory circuit, OS. RV is a radio valve (↓triode) and $H.T.$ is a high-tension battery, e.g. 100 volts. (The *Low Tension* battery – e.g. 6 volts – heats



OSCILLATOR

the cathode *C* so that it sends out electrons). The electrons pass from the ⊖ cathode to the ⊕ anode unless the grid *G* is strongly ⊖. When the electrons flow there is a current round the circuit *H.T.* – *RV* – *OS* – and so electricity goes into the oscillatory circuit *OS*. But we need the current only to flow into *OS* just at the right moment (like pushing a pendulum in the right direction when it is at the end of a swing); we need something to "turn on" the current at the right times.

In diagram (2) CL_2 is a coil round or near CL_1. CL_2 is joined to the grid. The swinging current in the oscillatory circuit (*OS*) produces a swinging current in CL_2 (↓ transformer), and so makes the grid ⊕ and ⊖ in turn. Hence the grid stops and lets electrons flow in turn according to the swinging of the current in the *OS*. When the whole instrument is started up, enough electricity flows into *OS* to start the swinging current –which then builds up. The batteries supply the energy to make up for the loss in *OS* by heat, etc.



OSCILLATORY CIRCUIT

'oscillatory circuit – see diagram. P_1 and P_2 are plates very near each other but not touching: they make a ↓ condenser. *CL* is a coil. There is an electric charge in this *circuit. When P_1 has its biggest ⊕ charge, P_2 has its biggest ⊖ charge. Then the charge swings round, making a current in the circuit: P_2 builds up to its biggest ⊕ charge and P_1 to its biggest ⊖ charge. The charge next swings back, and goes on swinging to and fro until its energy is lost (e.g. as heat). Compare these swings of electricity with the to-and-fro swinging of a pendulum: *(see oscillator for one way in which a charge gets into such a circuit.)

o'scillograph, o'scilloscope (ɔ'siləgræf) – instrument which records waves on a photographic film, or makes it possible to see them on a screen. e.g. a ↓ cathode ray tube can be so used.

/-ose (-ous) – sugar, e.g. **lactose** – the sugar of milk.

/-osis (-ousis) – disease of, e.g. **ne'phrosis** – disease of the kidney.

'osmium – an element, the heaviest (densest) substance known; blue-white, hard; used as an alloy with iridium for fountain pen nibs.

os'mosis (ɔz'mousis) – If a strong solution is on one side of a membrane and a weak solution on the other side, the solvent (e.g. water) passes through the membrane so that the solutions on each side tend to become equal in strength.

'ossa ('ɔsə) – bones. **'osseous** – bony. **'ossicle** – small bone, e.g. in the ear. **'ossifi'cation** – changing of tissue into bone, e.g. in a damaged joint.

oste-/-o-/- bone. **'osteoar'thritis** ('ɔstiouaa'θraitis) – a form of inflammation of the joints, especially of the leg, also of the spine: the cartilage (tough material) between the bones is destroyed and the surface of the joint becomes rough; the joint may in time cease to move. **os'teitis** – inflammation of a bone. **'osteoma'lacia** – ↓ ma'lacia. **'osteomye'litis** – inflammation of the marrow (soft centre part) of the bones. **oste'opathy** – system of treating certain diseases by skilled handling of the bones.

'ostiole, 'ostium ('ɔstioul, -iəm) – mouth-like opening.

ot-/-o-/ (out-) – ear, e.g. **o'titis** – inflammation of the ear. **'otoliths** – small chalky stones supported on fibres in the inner ear; they are part of the organ which gives sensation of moving up and down.

'Otto cycle ('ɔtou -) – the series of actions in the working of a four-stroke (ordinary kind of) motor-car engine: – (1) in-take of oil-vapour; (2) compress; (3) fire; (4) drive out burnt gases. (German, 1831–91.)

/-ous (-əs) – e.g. ferrous oxide. ↓ /-ic.

outboard motor – small petrol engine fixed outside the back of a boat to drive it.

'outcrop – mass of rock standing out through the surface of the soil.

'outfall (sewer) – main drain pipe which leads away the drainage from a town.

OUTBOARD MOTOR

'outlier ('autlaie) – area of younger rocks separated by erosion (wearing away by water, etc.) from the main mass of rock in that area.

'ova ('ouvə) – eggs.

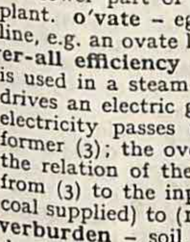
'ovary ('ouvəri) – female organ which produces ova; the lower part of the ↓pistil of a plant. **o'vate** – egg-shaped in outline, e.g. an ovate leaf.

over-all efficiency – Example: coal is used in a steam-engine (1) which drives an electric generator (2); the electricity passes through a transformer (3); the over-all efficiency is the relation of the power produced from (3) to the input of power (the coal supplied) to (1).

'overburden – soil which has to be dug away so as to get at clay or coal underneath.

over'casting – sewing pages together to make the sections (groups of e.g. 16 pages) which are sewn together to make a book.

'overshot wheel – water-wheel which is worked by water falling on to it from above.



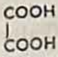
OVERSHOT WHEEL

'overtones – Any musical note (except a pure note as from a tuning fork) is made up of the main (fundamental) note and a number of notes higher than the fundamental note; these higher notes are the overtones.

ovi-/ – of eggs or ova, e.g. **'oviduct** ('ouvidʌkt) – the tube through which an egg passes out. **o'viparous** (o'vipærəs) – egg-laying, e.g. birds, lizards, snakes. **'ovi'positor** (-pɔzitə) – tube used to put an egg in position, e.g. of an insect which lays eggs in small holes in wood. **'ovu'lation** ('ɔvju-) – forming eggs; going down of an ovum from the ovary into the uterus (female organ of birth).

ovum ('ouvəm) – an egg; a female sex-cell; plural **ova** – eggs. **'ovule** ('ɔvjul) – female cell (in a plant) from which a seed is formed.

o'xalic acid (ɔk'sælik) – poisonous acid found in beetroot leaves, rhubarb, etc.; used in making ink, and for cleaning metal. **'oxa'luria** – presence of oxalic acid in the urine; due (e.g.) to eating strawberries, rhubarb, etc.



$$\begin{array}{c} COOH \\ | \\ COOH \end{array}$$

OXALIC ACID

'oxi'dation ('ɔksi'deiʃən) – the process of ↓oxidizing. ↓redox.

'oxide ('ɔksaid) – compound of oxygen and another element, e.g. zinc oxide, ZnO.

'oxidize ('ɔksidaiz) – (1) add oxygen to, e.g. copper is oxidized to copper oxide when it is heated in the air; (2) take away hydrogen from a compound by oxidizing the hydrogen to form water, e.g. ethyl alcohol is oxidized to make acetaldehyde; ($CH_3CH_2OH \rightarrow CH_3CHO$); (3) change a compound in which a metal has a low valency (joining power) into one in which the metal has a higher valency, e.g. ferrous chloride ($FeCl_2$) is oxidized to make ferric chloride ($FeCl_3$).

'oxime ('ɔksiim) – compound containing the group =N.OH, made from an ↓aldehyde or ↓ketone.

'oxy-/ ('ɔksi-) – sharp, pointed, e.g. **'oxyg'nathous** – having a pointed jaw; so also **'oxy'cephalous** (pointed head).

'oxy-/ ('ɔksi-) – having to do with oxygen, e.g. **'oxy-a'cetylene welding** – joining metal by means of a very hot flame of oxygen and acetylene gas. **oxyhaemoglobin** – ↓haemoglobin.

'oxygen ('ɔksidʒən) – gaseous element forming about $\frac{1}{5}$ of the air; essential for the respiration (breathing) of most forms of life and for combustion (burning).

'oxy'uris ver'micu'laris ('ɔksi'juurisvəə'mikiu'leəris) – small pointed worm found in the bowel = thread worm, pinworm.

'ozone ('ouzoun) – O_3 (molecule consisting of 3 atoms of oxygen); produced by passing a discharge (spark-flow) of electricity through oxygen; used in improving the air in underground railways.

'ozonide ('ouzonaid) – compound formed by the joining of ozone with a compound containing a double bond (double join) between C atoms, e.g. ethylene ozonide.

P

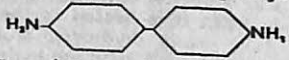
P – chemical sign for ↓phosphorus.

p – ↓para-.

P.D. – ↓potential difference.

P.E. – ↓probable error.

p*:*p – ↓para position in both rings, example *p*:*p*-diamino-diphenyl:–



p.r.n. – *pro re nata*; (medicine to be taken) for the (pain, etc.) if it comes.

PAB – ↓para-amino-benzoic.

pachy-/ (pæki-) – thick, e.g. **'pachyderm** – thick-skinned animal, e.g. elephant.

Pa'cinian 'corpuscles (pæ'siniən -) – oval nerve-endings below the surface of the skin, giving sensations of pressure and touch.

'packing – substance pressed (e.g.) round the moving rod of a pump to prevent water from escaping; so also in a steam engine.

pad-handle – handle into which various blades for cutting or filing may be fitted, e.g. pad-saw, as shown.

PAD-SAW

'paedi'atric medicine ('piidi'ætrik -) – the treatment of diseases in children.

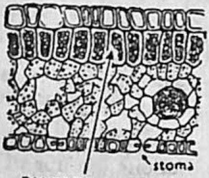
pair formation – formation, at one time, of two oppositely charged ions or particles, e.g. of an electron (negative) and a positron (positive) by ↓cosmic rays

palae-/-o-/ – old, ancient, e.g. **'Palaeocene** ('pælio'siin) – the earliest part of the ↓Cainozoic era (age); from about 50 to 60 million years ago. **'palaeon'tology** – the study of fossils and, by such study, learning the history of life on the Earth. **'Palaeo'zoic** – the era (age) of ancient forms of life on the Earth, about 500 million years ago.

pale, 'palea, 'palet (peil, 'pæliə, 'pælit) – small scale which (with the larger outer ↓glume) surrounds a grass flower. It forms part of the chaff rubbed off wheat, etc., in separating out the seeds for use.

palin-/ (pælin-) – again, back again, e.g. **'palin'dromic** (disease) (-'droumik) – which ceases and then comes back again. **'palin'genesis** (-'dʒenisis) – re-making of a rock by melting and solidifying again.

'palisade layer ('pæliseid -) – layer of cells just under the outer skin of a leaf at right angles to the skin. The cells contain ↓chlorophyll.



PALISADE LAYER

pa'lladium (pæ'leidiəm) – metal element (often found with platinum); it has great power of absorbing hydrogen; is used as a ↓catalyst, e.g. by its use hydrogen can be oxidized (made into H_2O, water) at room-temperature. It is also used as an alloy to make gold white; also for making non-magnetic watch springs.

'pallet ('pælit) – ↓lever escapement.

'palliative medicine ('pæliətiv -) – medicine which eases the discomfort or pain of an illness (but which is not a cure).

'palmate leaf ('pælmeit -) – leaf shaped like a hand with 5 or 7 fingers.

pal'mitic acid (pæl'mitik -) – $CH_3(CH_2)_{14}COOH$: one of the commonest fatty acids. Vegetable oils contain compounds of palmitic acid.

palp, 'palpus (pælp, 'pælpəs) – feeler (feeling organ) near the mouth of an insect, leg-like feeling organ of a spider.

pal'pation (pæl'peiʃən) – feeling the size and shape of an organ by laying the hand flat on the skin.

'palpebra ('pælpibrə) – eyelid.

'palpi'tation of the heart ('pælpi'teiʃən) – (feeling of) rapid beating of the heart.

'palsy ('pɔɔlzi) – form of ↓ paralysis agitans. **Bell's palsy** – loss of power over muscles of one side of the face.

'paludism ('pæljudizm) – malaria.

'Paludrine ('pæljudriin) – drug which attacks the malaria parasite at all stages of its life in the blood (but not when it is in the tissues): (trade name).

'Pamaquin – drug which acts in all stages of the malarial parasite except the non-sex stage of ↓ malignant malaria: (trade name).

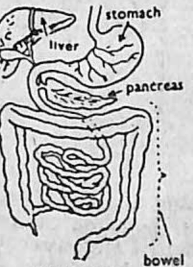
p-amino-benzoic acid – ↓ para-amino-benzoic.

pan – waterproof layer of hard earth below the surface, e.g. in a field, below the part turned up by the plough.

pa'nache (pæ'naaʃ) – dome (round roof) on a square base.

'panchro'matic film ('pænkro'mætik) – Ordinary film is not sensitive to red light; panchromatic film is sensitive to all colours.

'pancreas ('pænkriæs) – "sweetbread"; organ behind the lower part of the stomach; it opens into the small intestine (bowel) about 3 inches below the opening of the stomach and pours digestive juices (**pancreatic juice**) into the bowel. ↓ Langerhans.



PANCREAS

pan'demic disease (pæn'demik -) – disease found in all parts of a large area, e.g. a very wide outbreak of influenza, as in 1918, was pandemic.

pane, paen (pein) – the end of a hammer, e.g. ball-pane hammer (hammer with a ball at the other end as used by a metal-worker).

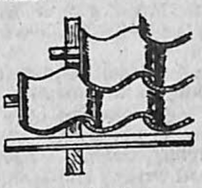
PANE

pan'genesis (pæn'dʒenisis) – the idea that all parts of an organism are represented in both the male and female sex cells. Contrast ↓ epigenesis.

PANICLE

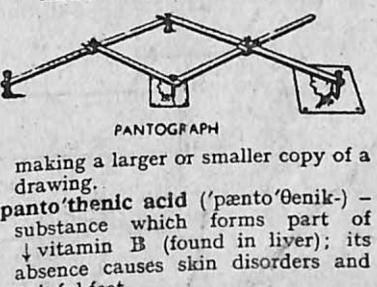
'panicle ('pænikl) – A row of flowers on a stalk, with the lower ones opening first, is a raceme. If each flower-branch is itself a raceme, the whole group of flowers is a panicle, e.g., vine.

'pantile ('pæntail) – S-shaped roof-tile made of pottery, as shown, about 13½ × 9½ inches.



PANTILE

'pantograph ('pæntəgraaf) – instrument, as shown, used for making a larger or smaller copy of a drawing.



PANTOGRAPH

'panto'thenic acid ('pænto'θenik-) – substance which forms part of ↓ vitamin B (found in liver); its absence causes skin disorders and painful feet.

pa'pain (pæ'pein) – substance from the papaw plant (a green oval gourd with black seeds); it is able to liquefy protein-containing substances.

pa'paverine (pæ'peivəriin) – substance present in opium; in small amounts it has a slight sleep-producing effect; in larger amounts it causes spasms (uncontrollable tightenings of the muscles).

'papier-'mâché ('pæpie-'maʃe) – paper softened with water, mixed with glue, and moulded to shape; it may be used as a paste or built up of sheets.

pa'pillae (pæ'pilii) – the small outstanding pieces of the true skin (dermis) which grow into the outer skin (epidermis); the small outstanding roughnesses of the tongue; similar growths on the inside of the bowel; singular, **papilla**. **'papil'litis** ('pæpil'aitis) – (1) inflammation of papillae; (2) inflammation of the end of the optic nerve at the back of the eye. **'papi'lloma** ('pæpi'loumə) – ↓ tumour (often harmless) resulting from a new growth of the ↓ papillae, especially in the bladder (organ in which urine collects).

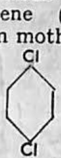
'pappus ('pæpəs) – ring of hair or feathers on the top of a fruit, used for scattering the seeds by the wind, e.g. dandelion.

'papule ('pæpjul) – small solid raised spot on the skin, as in ↓ measles.

para-/ (pærə-) – (1) disorder of, e.g. **'paraesthesia** – abnormal sensations, e.g. tingling, tickling. **'para'graphia** – bad writing and spelling (due to injury to the brain).

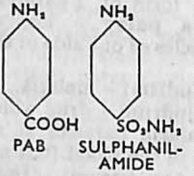
para-/ (pærə-) – (2) at the side of, along side of, e.g. **'parabi'otic twins** = Siamese twins – two persons living joined together side by side.

para-/ – (chemistry): with two atoms or groups joined to a ↓ benzene ring in the positions shown, e.g. paradichlorbenzene (used to protect clothes from moths):

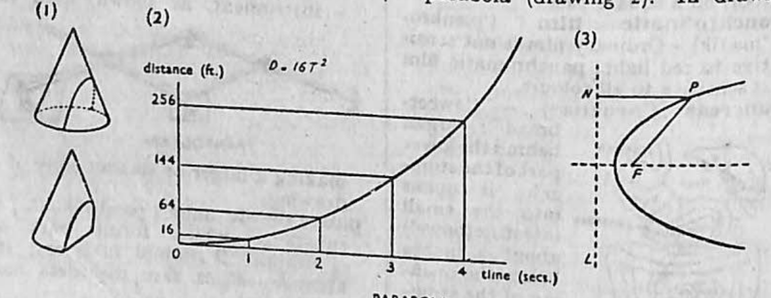


/-para – e.g. **pri'mipara** (prai'miparə) – woman having her first baby; **multipara** – woman who has had many babies.

'para-a'mino-ben'zoic acid (-əmiino-benzoik) – also called PAB, substance used by living things, including bacteria, in forming the nuclei of cells. The ↓ sulphanilamide drugs are similar in form and thus prevent the use of PAB by bacteria; hence their effect. ↓ folic acid, of which PAB is a component (part).



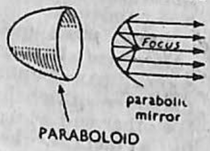
pa'rabola (pə'ræbələ) – curve made by cutting a cone parallel to a sloping edge (diagram 1). The curve made by a ball (etc.) which is thrown through the air is a parabola. The curve drawn in making a graph of the distance through which a stone has fallen after different times is a parabola (drawing 2). In drawing (3), L is a straight line and F a fixed point. P is *any* point on the parabola. The distance PF always equals the right-angled distance PN. F is called the **focus**, and L the **directrix** of the parabola.



PARABOLA

'para'bolic – shaped like a parabola, e.g. a parabolic arch.

pa'raboloid – curved solid as shown, circular when seen from the end, parabolic when seen from the side. A mirror made of this curved

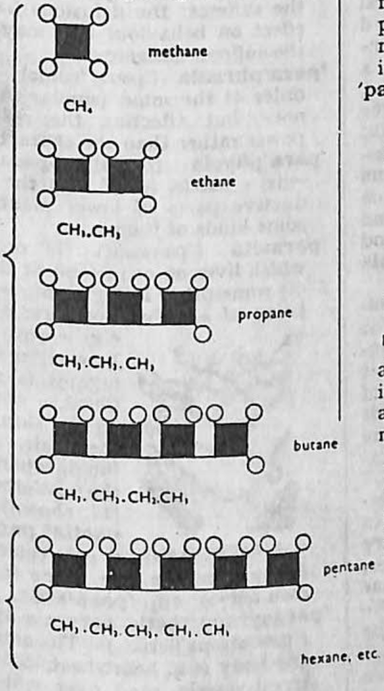


PARABOLOID

shape is a **parabolic mirror.** If a lamp is placed at the focus of the parabola all the reflected rays of light are parallel: used e.g. in searchlights and car-lamps.

'parachor ('pærækɔɔ) – ("by the side of, compared with . . . space"): a number showing the volumes of atoms compared with the volume of the molecule composed of those atoms in a liquid compound; e.g. the parachor of carbon = 4·8; – of hydrogen = 17·1; so the parachor of ethane, C_2H_6, is 112·2 (4·8 × 2 + 17·1 × 6 = 112·2). A similar substance with parachor 151·2 must be C_3H_8 – propane. The space filled by things depends on (1) the size of things and (2) on how they are joined. Thus a double bond, e.g. C:C, adds to the parachor as compared with the single bond C.C. The parachor of $CH_2.CH_2$ would be 78 (2 × 4·8 + 4 × 17·1); but the parachor of $CH_2{:}CH_2$ is 101·2, 78 + 23: this 23 is extra because of the double bond. The parachor is especially used in finding how atoms are joined in molecules. Parachor =

$$\frac{\text{Molecular weight}}{\text{Density of liquid} - \text{Density of vapour}} \times \sqrt[4]{\text{Surface tension}}$$

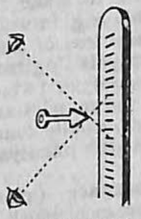


PARAFFINS

'paraffins, paraffin 'hydro'carbons ('pærəfinz) – = alkanes = compounds of hydrogen and carbon whose molecules consist of a chain of CH_2 groups, i.e. $CH_3.CH_2 \ldots CH_2.CH_3$. The first four are gases; those with C5 and C6 are liquids contained in petrol; with C10–C16 are liquids contained in lamp-oil (kerosene, paraffin-oil); those with C17 upwards are solids.

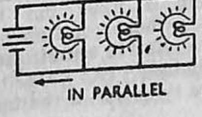
pa'raldehyde (pæ'rældihaid) – $(CH_3CHO)_3$ (three ↓acetaldehyde molecules joined together); a sleep-producing drug, not habit forming, not depressing (slowing) the heart; it leaves a very unpleasant taste.

'parallax ('pærəlæks) – When an object is looked at from two different places it seems to change its position in relation to what is seen beyond it. The Earth revolves and so causes a diurnal (daily) parallax; the Earth also goes round the sun causing an annual (yearly) parallax. The solar system (sun and all its planets) is itself moving, causing a **secular parallax,** so that after a million years the shapes of the groups of stars will seem changed. **parallax error** – wrong reading of the scale of an instrument due to not having the eyes level with the pointer.



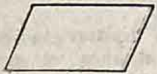
PARALLAX ERROR

'parallel connections; **(lamps, etc.) in parallel** ('pærəlel-) – lamps, resistances, etc., joined in an electric circuit



IN PARALLEL

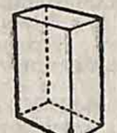
as shown. The current from the battery divides, part going through each branch. Lamps are usually connected in parallel; so each receives the full pressure of the source (battery, generator), and each can have a separate switch for turning it on or off. ↓ series.


PARALLELOGRAM

para′llelogram (pærə′lelogræm) – a plane (flat) 4-sided figure with opposite sides parallel (and equal).

para′llelogram of forces – ↓ forces.

′parallelo′piped (′pærəlelo′paiped) – six-sided solid as shown.


PARALLELOPIPED

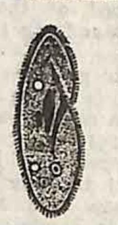
pa′ralysis (pə′rælisis) – loss of muscular power owing to disease of the nerves or brain. Where there is only weakening (not total loss) it is called **pa′resis** (pæ′riisis). **creeping paralysis** = locomotor ataxia – a gradual disease of the spinal nerves, causing loss of power to make the muscles work together, e.g. in walking, and, later, general loss of muscular control. **paralysis ′agitans** (- ′ædʒitæns) – paralysis which causes stiffening of the muscles and shaking of the limbs; usually found in aged persons. **infantile paralysis** – ↓ poliomyelitis.

′paramag′netic substance (′pærəmæg′netik -) – substance which is very weakly magnetized by a magnetic field in such a way that it moves towards the strongest part of the field. (Iron also moves towards the strongest part, but is far more strongly magnetized than paramagnetic substances).

pa′rameter (pə′ræmitə) – "side measure" – quantity which is fixed in one case (or thing) but can vary from one case (or thing) to another, e.g. the resistance of a particular electric circuit is fixed but the resistance of another circuit may be different. **parametric equations** – The relation between two quantities X and Y may be given in the form of two mathematical equations, one stating how X depends upon a third quantity P and the other how Y depends upon P; P is the parameter.

′para′metrium (′pærə′metriəm) – the connective (joining) tissue round the lower part of the uterus (organ of childbirth).

para′moecium (pærə′miisiəm) – the Slipper animalcule, a small water-organism, just large enough to be seen without a microscope; shape as shown.


PARAMOECIUM

′para′noia (′pærə′nɔiə) – (*para-* = aside, disorder of –; *-noia* = mind): disorder of the mind (serious and not often curable) in which there are fixed delusions (ideas not true to reality), e.g. that others are secretly planning to harm the sufferer: the delusions have an effect on behaviour and may make the sufferer dangerous.

′para′phrenia (′pærə′friiniə) – disorder of the mind (similar to paranoia) but affecting the reasoning power rather than the character.

′para′physis (/**-ses**) (′pærə′faisis, -siiz) – hair(s) found near the reproductive parts of lower plants, e.g. some kinds of fungus.

′parasite (′pærəsait) – organism which lives on or in (and at the cost of) some other living thing, without being of any help or service to it, e.g. worms in the bowel, malaria organisms in the blood, creatures on the skin, or in the hair. Some fungi are parasites: the mistletoe plant (as shown) is a **partial parasite**: it gets some of its needs from the tree, some from its own leaves: adj. **′para′sitic**.

PARASITIC PLANT

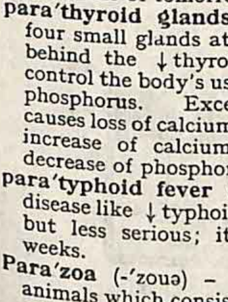
′parasympa′thetic nervous system (′pærəsimpə′θetik -) – The actions of the body (e.g. heart-beat, control of blood-vessels, etc.) over which the conscious mind has no control, are governed by nerves leading into (or out from) the lower brain and the spinal cord. These form the sympathetic and parasympathetic nervous systems. The sympathetic system causes action, e.g. speeds up the heart, opens up the blood vessels; it "deals with the needs of today". The parasympathetic system is more concerned with the feeding, strengthening, resting of the organs which it controls; in general it "deals with the needs of tomorrow".

para'thyroid glands (-'θairɔid -) – four small glands at the side of and behind the ↓thyroid gland. They control the body's use of calcium and phosphorus. Excessive activity causes loss of calcium from the bones, increase of calcium in the blood, decrease of phosphorus in the blood.

para'typhoid fever (-'taifɔid -) – a disease like ↓typhoid (enteric) fever, but less serious; it lasts about 3 weeks.

Para'zoa (-'zouə) – small group of animals which consist of a number of cells but have no nerves or hollow (body cavity) inside, e.g. the creatures which make sponges.

'parbuckle ('paabʌkl) – arrangement of ropes as shown for pulling up a barrel, e.g. from the inside of a ship.



PARBUCKLE

'parcel a rope ('paasl) – cover a rope with canvas so that it may not be weakened by rubbing.

'pare'goric ('pæri'gɔrik) – mixture of camphor, opium, benzoic acid, anise, for coughs.

'paren'chyma, 'paren'chymatous tissue ('pæren'kaimə) – thin-walled short cells making a soft spongy tissue which supports and fills in spaces of the body of an animal and of a plant, e.g. the pith (soft centre part) of the stem of a plant.

pa'renteral administration of a drug (pæ'rentərəl) – giving a drug by injection or rubbing it in; not by drinking it, or putting it into the bowel.

'paresis ('pærisis) – ↓paralysis.

'pargeting ('paadʒitiŋ) – lining the inside of a chimney with a special cement.

par'helion (paa'hiiliən) – image of the sun sometimes seen at the side of the sun at sunset; caused by ice-crystals in the atmosphere.

pa'rietal (pæ'rai.itl) – (*paries* – wall); belonging to the wall of a cavity in the body, e.g. **parietal pleura** – part of the membrane which lines the cavity of the chest. **parietal bones** (of the skull) – side bones.

'Paris green ('pæris -) – mixture of copper acetate and copper arsenite used to kill insects.

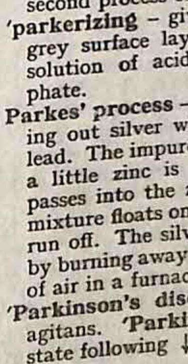
'parison ('pærisən) – the first rough shape of a glass thing (e.g. bowl, jug, etc.) which is later finished in a second process or machine.

'parkerizing – giving iron or steel a grey surface layer by boiling in a solution of acid manganese phosphate.

Parkes' process – method of separating out silver which is mixed with lead. The impure lead is melted and a little zinc is added. The silver passes into the zinc; the silver-zinc mixture floats on the top and can be run off. The silver is then obtained by burning away the zinc in a stream of air in a furnace.

'Parkinson's disease – ↓paralysis agitans. **'Parkinsonism** – similar state following ↓encephalitis lethargica.

pa'rotid gland (pə'rɔtid) – gland at angle of lower jaw; it produces saliva (liquid in the mouth): it becomes inflamed in ↓mumps.

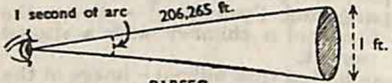


PAROTID GLAND

'-parous (-pærəs) – giving birth to, e.g. **'viviparous** – producing living young (not eggs).

'parquetry ('paakitri) – blocks of different coloured woods set into a surface to form a design, used e.g. as a floor or table-top.

parsec ('paasek) – At a distance of 206,265 feet the outside edges of a circle 1 foot in diameter make an angle of 1 second of an ↓arc. Suppose that instead of a circle 1 foot in diameter we take a circle whose diameter is the distance of the Earth from the sun (93 million miles). Then this circle would have to be 206,265 × 93 million miles away for it to make an angle of 1 second at the Earth. This distance (roughly 19 million million miles) is one parsec. Used in measuring distances of stars.



PARSEC

'partheno-/ ('paaθeno-) – unfertilized, e.g. **'partheno'genesis** – reproduction without fertilization by a male.

'partial ('paaʃəl) – **adj.,** of a part, e.g. partial combustion = burning of a part (not all) of a substance.

'partial corre'lations (-'kɔre'leiʃənz) – Coefficients of correlation show the amount of agreement between two sets of measures by a figure between + 1 (= complete agreement) and − 1 (= complete disagreement). Suppose we test many children and find that the coefficient of correlation between their examination marks in English and arithmetic is + 0·5. But both English and arithmetic are affected by general intelligence and this partly accounts for the amount of agreement. By finding the coefficient of correlation between English and intelligence, and between arithmetic and intelligence, we can work out the partial coefficient of correlation between English and arithmetic, and this shows the remaining amount of agreement when the effect of intelligence is allowed for.

'partial parasite – ↓parasite.

'partial 'pressures – ↓Dalton's law.

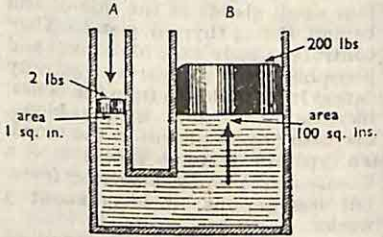
'partials – any one of the single frequency notes which make up a complicated note, e.g. of a ringing bell.

'parting bead ('paatiŋ biid) – a strip of wood separating the part of a window which slides down from that which slides up. **parting slip** – piece of wood between the weights in such a window.

'partu'rition ('paatju'riʃən) – giving birth to young; adj. **par'turient** (-'tjuuriənt).

PAS – para-amino-salicylic acid; similar to ↓PAB but it has an effect on certain kinds of tuberculosis.

'Pascal's law ('pæskəlz) – The pressure on a liquid in a container is transmitted undiminished (passed on without becoming less) in all directions; see diagram: 2 lb. pressure on 1 square inch at A produces 2 lb. per square inch (= 200 lb.) at B.



PASCAL'S LAW

Pascal's triangle – arrangement of the ↓binomial coefficients. Any number in the triangle (e.g. 6 in line 5) is obtained by taking the number above it (3) and adding the number on the left of that above it (3). (French, 1623–1662.)

1
1 1
1 2 1
1 (3)+(3) 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
etc. PASCAL

'Passerines, 'Passeri'formes ('pæsəriinz, /-i'fɔɔmiz) – birds whose feet are so shaped that they can sit holding on to a branch or stand on the ground, e.g. most garden and woodland birds, but not ducks, vultures.

'passive 'immuni'zation ('pæsiv 'imjunai'zeiʃən) – protecting against disease by injecting substances formed in the body of animals to resist that disease. ↓ active.

'passive metals – metals which form a thin layer of oxide or other compound on their surface which protects them from attack by acids, e.g. chromium, nickel, tin, aluminium.

paste (peist) – special glass (strass) of which artificial jewels are made: substance of which pottery is made, e.g. china-clay. ↓ pâte.

'pasteurizing ('paastəraiziŋ) – heating (e.g. milk) to about 65° C. for 30 minutes so as to kill bacteria in it. (Pasteur, French, 1822–1895.)

pâte (paat) – ↓ paste used for porcelain (fine pottery), e.g. **pâte dur** (- duur) = hard paste (china stone + clay). **pâte tendre** (- tɔndr) = soft paste (powdered glass, etc., as for imitation porcelain).

PATELLA

pa'tella (pə'telə) – ("small plate"): the knee-cap (small round bone in front of the knee).

patent leather – leather with a very polished surface, made by covering the leather with varnish.

patent log – ↓ log.

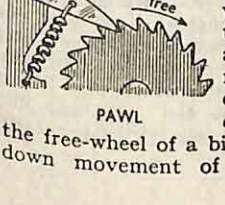
path-/ – disease.

pathogen ('pæθodʒen) – organism or substance which produces disease. **pa'thology** – study of the cause, nature and results of diseases.

'patina ('pætinə) – effect of age on the surface of very old things, e.g. the green surface-layer on very old coins.

'pattern ('pætən) – shape (e.g. of wood) pressed into sand used in casting metal; the hollow so caused is filled with melted metal.

pawl (pɔɔl) – instrument used to prevent a toothed wheel from turning backwards (as in the winding of a clock), or make it drive only in one direction as in the free-wheel of a bicycle; the up-down movement of the pawl is sometimes used to change a circular movement into a number of small straight up and down movements.



PAWL

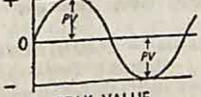
pay-/ e.g. **'paydirt** – sand in which there is a lot of gold. **'pay-load** – that part of the weight carried by an aeroplane which brings in money; e.g. the goods and passengers, but not the petrol and the pilot.

Pb – chemical sign for lead.

Pd – chemical sign for ↓ palladium.

peak load – the greatest amount of electricity which a power-station has to supply, as when very many people are turning on electric fires, machines and travelling by electric trains, e.g. at 8–10 a.m.

peak value – An alternating current rises to biggest strength (e.g. 1 ampere) in one direction, decreases to zero, rises to biggest strength in the opposite direction, and so on. The biggest strength, in either direction, is the peak value. So also for alternating pressure (voltage).



PEAK VALUE

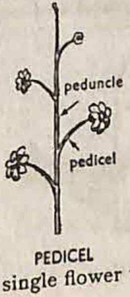
pean – ↓ pane.

'pearlite ('pəəlait) – a form of steel which consists of closely mixed grains of almost pure iron (= ferrite) and of iron carbide (grey, very hard = cementite). **pearlite iron** – grey cast iron consisting of pearlite and graphite.

pear oil = ↓ amyl acetate.

'pecten ('pekten) – comb-like thing. **'pectinate** – like a comb.

'pectin – substance contained in the cell-walls of fruits: it causes fruit to set (solidify) into a jelly when boiled with sugar to make jam.



PEDICEL

'pectoral ('pektərəl) – of the chest.

'pedes ('pediiz) – feet.

pedi-/, pedo-/ – of feet, e.g. **pe'dometer** – instrument for measuring distance walked.

pedi'atric – ↓ paediatric.

'pedicel ('pedisel) – flower-stem of a single flower when a group of flowers grows on a bigger main stem (the ↓peduncle).

pe'dicu'losis (pe'dikju'lous is) – state in which the body is covered with **pe'diculi** (lice = very small, spider-like, blood-sucking creatures); singular – **pe'diculus.**

pe'duncle (pi'dʌŋkl) – main stem of a flower; part of an organ which joins a smaller piece on to some larger piece: for diagram see pedicel.

'pegmatite ('pegmətait) – (*pegma* – framework): igneous (heat-formed) rock with layers of earlier rock-substance in it. These layers are composed of coarsely crystalline substance.

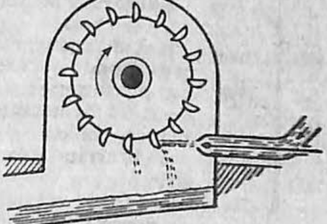
pe'lagic (pe'leidʒik) – of the open sea; living in the sea. **pelagic migrants** (-'maigrənts) – birds which fly away over the sea in autumn.

pe'llagra (pe'laagrə) – disease caused by lack of ↓vitamins (especially nicotinic acid as in fresh meat, eggs, liver). Early signs are age neral feeling of illness (headache, etc.), and a darkening of the skin; later it affects the nerves, causing sleepiness, loss of power in the legs, and sometimes mental disorder.

'pellicle ('pelikl) – thin membrane, thin surface layer, e.g. the light-sensitive layer of a photographic film or plate; the reflecting mirror (made of ↓collodion) in a camera used for colour photography.

'Peltier effect ('peltie -) – the giving out or taking in of heat at the join between two metals when an electric current flows across the join.

'Pelton wheel (peltən -) – power-producing instrument in which cups on a wheel are struck by a jet of water so causing the wheel to turn.



PELTON WHEEL

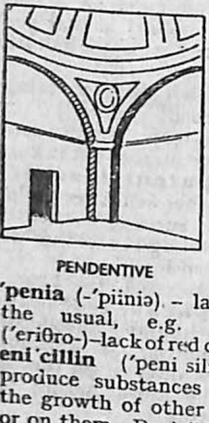
'pelvis ('pelvis) – ring of bones at the base of the body on which the legs are jointed.

PELVIS

'pemphigus ('pemfigəs) – skin disease causing raised spots on the skin filled with clear liquid (blisters).

'pencil (of light) ('pensl) – narrow beam slightly spreading out from a point.

pen'dentive (pen'dentiv) – curved triangle as formed by one side of a round roof fitted on to a square base.



PENDENTIVE

'pene'plain ('piini'plein) – stretch of fairly flat low country caused by much wearing of the Earth's surface by weather, etc.

/-'penia (-'piiniə) – lack of, less than the usual, e.g. **'erythro'penia** ('eriθro-)–lack of red cells in the blood.

peni'cillin ('peni silin) – 'Fungi produce substances which prevent the growth of other organisms near or on them. Penicillin is the protective substance of the *mould *Penicillium*. It is the most powerful bacteria-destroying substance, and the least harmful to the sick person on whom it is used. It acts especially on ↓Gram-positive bacteria: *(forms of fungus which spread over a surface, e.g. the surface-growth on old bread, moist leather).

/-'pennate (-'peneit) – winged, e.g. **'brevi'pennate** – with short wings.

'penstock ('penstɔk) – (1) gate controlling the flow of water in a large pipe or channel; (2) channel leading water to a water-wheel; pipe leading the water to the ↓turbine in a water-power electricity-generating station.

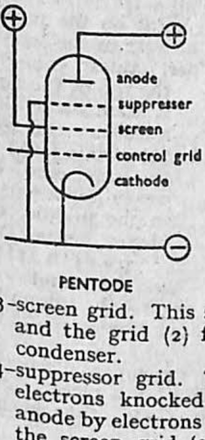
pent-/-a-/ (pent-) – five, e.g. **'pentagon** – plane (flat) figure with 5 angles (and 5 sides).

'pentagrid ('pentəgrid) – (First see triode.) A pentagrid is a radio valve with five grids (networks): so, with the anode (⊕) and cathode (⊖), it is a heptode – 7-electrode valve. It is a double valve; one part produces high-frequency oscillating current; this oscillating current is mixed with the incoming wave and so produces the ↓heterodyne effect.

pen'tamerous (pen'tæmərəs) – having five parts, e.g. petals in rings of five. ↓trimerous.

'pentane ('pentein) – ↓paraffin.

'pentane lamp, Vernon Harcourt pentane lamp – lamp burning pentane which, under certain fixed conditions, produces a light of exactly 10 ↓candle-power; is used in measurements of the powers of light sources.



PENTODE

'pentode ('pentoud) – (First see triode.) A pentode is a radio valve with 5 electrodes:–

1–cathode – which sets free electrons.

2–control grid. This controls the flow of electrons according to its voltage.

3–screen grid. This stops the anode and the grid (2) from forming a condenser.

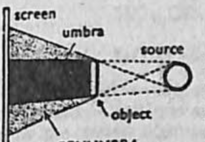
4–suppressor grid. This stops any electrons knocked out from the anode by electrons from getting to the screen grid (3). (↓secondary electrons.)

5–anode ⊕.

'pentose ('pentouz) – a fruit sugar containing five oxygen atoms in the molecule; it does not ferment.

'Pentothal ('pentoθæl) – a sleep-producing drug (↓barbiturate); injected into a vein it produces unconsciousness for surgery: (trade name). Chemical name – thiopentone.

pe'numbra (pe'nʌmbrə) – (*pene-* = nearly; *umbra* = shadow): nearly dark space between the dark shadow and fully lit part; e.g. round the Earth's shadow in an eclipse.



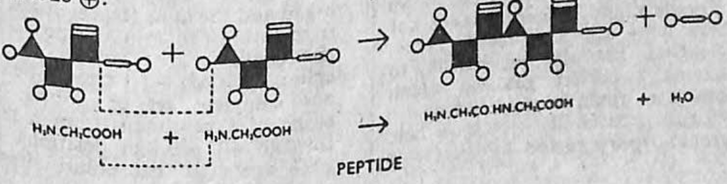
PENUMBRA

'pepsins ('pepsinz) – a class of proteins which break up other proteins: ↓enzyme. **'pepsin** – substance in the stomach which digests proteins. **'peptonized food** – food treated with pepsin and pancreatin (digestive liquids of the ↓pancreas) and so already digested before it is eaten by a sick person.

'peptic 'ulcer ('peptik 'ʌlsə) – Ulcer = destruction of part of the surface of the skin or membrane lining an organ, e.g. by an infection or by a diseased growth (cancer). Peptic ulcer = ulcer (not due to cancer) inside the stomach or upper bowel.

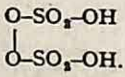
'peptide 'linkage ('peptaid liŋkidʒ) – way in which *amino-acids join together to form more complicated amino-acids. In the diagram, 2 molecules of amino-acetic acid join to form a dipeptide, losing one molecule of water, H_2O. This dipeptide can join with another amino-acid to form a tripeptide, and so on. Proteins are very complicated polypeptides: *(acid containing the NH_2 group).

per-/ (pəə-) – (1) loosely used to show that the chief atom in a compound


+
→
+
$H_2N.CH_2COOH$ + $H_2N.CH_2COOH$ → $H_2N.CH_2CO\,HN.CH_2COOH$ + H_2O

PEPTIDE

has a higher joining power with oxygen than is usual, e.g. lead oxide PbO, lead peroxide PbO_2; potassium chlorate $KClO_3$, potassium perchlorate $KClO_4$; (2) exactly, used for an acid, oxide or salt in which 2 oxygen atoms are joined together, e.g. persulphuric acid



$$\begin{array}{l}O\text{–}SO_2\text{–}OH\\ |\\ O\text{–}SO_2\text{–}OH.\end{array}$$

Such acids are **per-acids.**

per'ception (pə'sepʃən) – Sensations are impulses along a nerve, e.g. along the optic nerve (of sight); in the act of perception these impulses are related to each other and to memories of earlier experiences, and are so recognized and understood.

'percolate ('pəəkəleit) – run slowly through a mass of powder, e.g. town-drainage is percolated through sand and stones as part of the process of purifying it. Coffee is sometimes made by percolating hot water through ground coffee.

per'cussion (pə'kʌʃən) – ("hitting through"): way in which a doctor examines the body by tapping one finger with the other near the surface of the body and noticing the sound so produced from the part below. **percussion cap** – a cap in the centre of the back of a cartridge which is exploded when the striker-pin of a gun or rifle hits it. **percussion fuse** – similar cap in the nose of a shell to explode it when it strikes. **percussion instruments** (of music) – instruments which are hit, e.g. drum, triangle, cymbal.

pe'rennial plant (pə'reniəl) – plant which lives for several years: (an annual plant produces seed and dies in its first year).

perfect gas – The pressure, volume, and temperature of a gas are related in ways described by certain laws (↓ Boyle's law, ↓ Charles' law); but these laws are not exactly true. Scientists find it convenient to imagine a perfect gas for which these laws would be exactly true.

'perforate ('pəəfəreit) – make a hole through. **perforation** (medical) – a breaking-through the diseased part of the stomach or bowel so that food, decayed matter and bacteria can go into the ↓ peritoneum.

perfusion – ↓ /-fus-/.

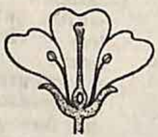
peri-/ (peri-) – round. **'perianth** (-ænθ) – part of the flower which is outside and round the reproductive parts; the word is used particularly of flowers such as daffodil, iris, etc., in which there is no difference in appearance between petals and *sepals: *(in many flowers, sepals = the green scales below the petals). **'peri'cardium** ('-kaadiəm) – the membrane surrounding the heart. **'pericarp** ('perikaap) – wall round a (true) fruit, e.g. the skin of a cherry or grape.

PERIANTH

'peridot ('peridɔt) – clear green precious stone. ↓ olivine.

'perigee ('peridʒii) – (*peri-* = round: *ge-* = Earth): point on the moon's orbit which is nearest to the Earth.

'peri'gynous ('peri'gainəs) – having the top of the flower-stem shaped like a shallow cup with the petals (etc.) on its edge, and the ovary (female part) in the middle, e.g. cherry, peach.



PERIGYNOUS

'peri'helion ('peri'hiiliən) – (*peri-* = round: *heli-* = sun): point nearest the sun on the path of any planet moving round the sun.

pe'rimeter (pe'rimitə) – "measure round" – outline of a closed figure (e.g. an oblong, a field); the length of this outline.

peri'neum (peri'niiəm) – the area (between the legs) between the sex organ and the anus (bowel outlet): it is sometimes torn in the process of childbirth.

'period ('piəriəd) – (1) time taken by one complete set of events, e.g. swing of a pendulum from a point through all possible positions and back again to that point; time in which a planet moves round the sun; (2) division of a geological era, e.g. the Cretaceous (chalk) period of the Mesozoic era; (3) time of monthly blood-loss of a woman.

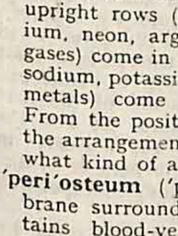
'peri'odic acids ('pəə.ai'ɔdik) – acids derived from the imaginary iodine oxide I_2O_7, e.g. HIO_4. ↓ per-.

'peri'odic system ('piəri'ɔdik -) – an arrangement of the chemical elements in order of their ↓atomic numbers. The elements are arranged in cross-rows so that elements which are similar come in the same upright rows (columns). Thus helium, neon, argon . . . (all ↓inert gases) come in one column; lithium, sodium, potassium . . . (similar alkali metals) come in another column. From the position of an element in the arrangement we can tell roughly what kind of an element it is.

'peri'osteum ('peri'ɔstiəm) – membrane surrounding a bone; it contains blood-vessels supplying the bone.

pe'ripheral (pə'rifərəl) – in the **pe'riphery** = outer part, e.g. **pe'ripheral neu'ritis** – inflammation of the nerves in the outer parts of the body, e.g. hands, feet.

'periscope ('periskoup) – instrument for looking over a wall, (etc.). The drawing shows a simple kind with mirrors. Prisms can be used instead of mirrors; in a submarine periscope (for looking above the surface of the sea) lenses are fitted so that the periscope also acts as a telescope.



PERISCOPE

'peris'talsis ('peris'tælsis) – the waves of contraction passing along the bowel driving its contents onwards.

'perito'neum ('peritə'niiəm) – ("round-stretched"): bag-like membrane lining that part of the body in which lie the stomach, liver, bowels, and the uterus (organ of child-birth). These organs are not inside the peritoneum but are pressed into the bag from outside and the peritoneum is folded round the organ (compare a soft ball folded about a finger pressed into it). There are no organs inside the peritoneum; it has a very smooth slippery lining. In case of ↓ perforation, septic material from the bowel or stomach enters the peritoneum and causes roughening and growing together of the inside surfaces of the peritoneum (= adhesions). Such infection of the inside of the peritoneum is called **'perito'nitis.**

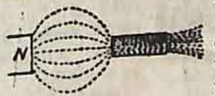
'Permalloy ('pəəmælɔi) – alloy of nickel, iron (and other metals) which has great magnetic ↓permeability: used to make cores (centres) of electro-magnets because it easily magnetizes and demagnetizes with little waste of energy: (trade name). ↓ hysteresis.

'permanent ('pəəmənənt) – lasting, not changed from time to time. **permanent way** – the finished track of a railway (not the lines put down for a short time while building the railway. **permanent hardness** (of water) – hardness (due to calcium and magnesium sulphates and chlorides) which cannot be removed by boiling. ↓ temporary hardness.

'permanent gas – gas (e.g. oxygen, hydrogen) which cannot easily be changed to liquid. It was once thought that these gases could not be changed into liquids and so must permanently (= always) be gases.

per'manganate (pəə'mæŋgəneit) – salt of permanganic acid ($HMnO_4$), e.g. **potassium permanganate, sodium permanganate** – both powerful oxidizing substances, used as disinfectants and antiseptics: ↓ per-/, Condy.

'permea'bility ('pəəmiə'biliti) – quality of allowing a liquid or gas to pass through, e.g. through the cloth of a balloon. **permeability** (magnetic) – If a piece of iron is placed in a magnetic field the lines of force crowd through it. The permeability is a measure of this crowding. It also measures how much weaker the magnetic force is if



PERMEABILITY

it passes through a block of the substance: ↓ Permalloy.

′Permian rocks (′pəəmiən) – rocks formed in the Permian period of time, from 220 to 155 million years ago. The period is the latest (most recent) part of the Palaeozoic (Old-Life) age. In the Permian rocks lizards and ferns are found: the Atlantic ocean was perhaps divided into two parts (N. and S.) by land. (Named after Perm, a part of Russia.)

′permit′tivity – another word for ↓ dielectric constant.

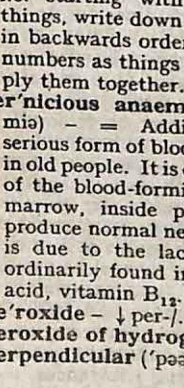
′permu′tations (′pəəmju′teiʃənz) – the number of different arrangements of a certain number of things taking so many at a time; e.g. "In how many ways can 6 different things be arranged taking 4 at a time?" The answer is 6 × 5 × 4 × 3 (= 360), i.e. starting with the number of things, write down a row of numbers in backwards order, taking as many numbers as things taken, and multiply them together.

per′nicious anaemia (pə′niʃəsæ′niimiə) – = Addisonian anaemia: serious form of blood-disease, usually in old people. It is caused by a failure of the blood-forming organs (in the marrow, inside part of bones) to produce normal new blood cells; this is due to the lack of a substance ordinarily found in the liver. ↓ folic acid, vitamin B_{12}.

pe′roxide – ↓ per-/.

peroxide of hydrogen – ↓ hydrogen.

perpendicular (′pəəpəndikiulə) – a line at right angles to another line, or surface at right angles to another surface.



PERPENDICULAR ARCHITECTURE

perpendicular architecture – way of building with many upright lines and large windows; as shown.

per′pends (pə′pendz) – the up/down lines at the end of bricks in a brick wall.

per′ron (pe′rɔn) – staircase outside a building.

per sec. per sec.; per sec.^{2}; – e.g. a falling stone gains speed at the rate of 32 ft. per sec. per sec. = at the end of each second the speed is 32 ft. per sec. more than it was at the beginning of the second.

′Perseids (′pəəsii.idz) – large number of meteors (shooting stars) seen each year during August, near Perseus (group of stars in the northern sky).

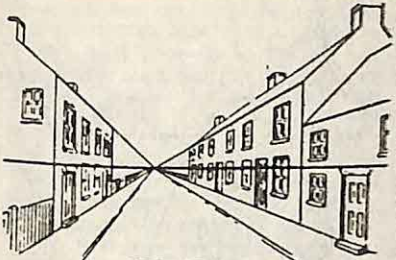
per′seve′ration (pə′sevə′reiʃən) – tendency of a set of ideas or feelings to stay on in the mind, e.g. a person is told to cut out all the letter A's in some print; after a time he is told not to strike out A's but to strike out E's: the perseveration of the first order causes mistakes. So also the perseveration of a tune of music "in one's head", and (in persons of disordered mind) meaningless repetition of a word or action.

per′sistence of vision (pə′sistəns -) – An image continues to be seen in the eye for about 1/12 second after the light which caused it has ceased, because the action of the eye is a chemical one and the chemical substances do not recover (change back) at once. For this reason the many separate pictures in a cinema are seen as one moving picture, not as "Picture 1: black-out: picture 2: black-out" (which is what really shows on the screen).

′personal e′quation – amount which must be added to (or taken from) a measure because of the usual error of the person who made the measure, e.g. some people react more quickly than others in pressing a lever when a sign or order is given. The personal equation corrects the measure so as to allow for this.

pers′pective (pəs′pektiv) – way of drawing a picture so that more distant things seem distant in the picture, e.g. (1) by making the distant thing smaller, and (2) **aerial perspective** – making the distant thing in a picture less clear and less brightly coloured (more blue and grey).

′Perspex (′pəəspeks) – trade name of



PERSPECTIVE

a ↓methyl methacrylate plastic; used, e.g. for the windscreen of a car.

per-sulphuric – ↓per-/.

′pertur′bations (′pəətə′beiʃənz) – irregularities of the movements of planets caused by the gravitational force of one planet on another. The study of perturbations sometimes leads to the discovery of unknown planets, e.g. Neptune was discovered from the perturbations of Uranus.

per′tussis (pə′tʌsis) – = ↓whooping cough: infectious disease (especially of children) in which there are long attacks of coughing and the air is drawn in (while coughing) with a loud "Whoop!"

per′version (pə′vəəʃən) – abnormal (unusual, diseased) form of sexual emotion and behaviour.

pes, ′pedes (piiz, ′pediiz) – Latin word for foot, feet.

′pessary (′pessəri) – instrument put into the vagina (female sex-organ) to hold the uterus (organ of child-birth) up in place; drug put into the vagina.

′pestle (pestl) – used with a ↓mortar (hard stone cup) for grinding substances to powder.

pe′techia (-iae) (pe′tiikiə, – i.ii) – small red or purple spot(s) on the skin due to bleeding.

′petiole (′petioul) – the stem of a leaf. **′petio′late** – having a leaf stem.

′petit mal (′peti mæl) – less serious form of ↓epilepsy.

′petri-/, ′petro-/ (′petri-, ′petro-) – having to do with stone, e.g. **′petri′faction** – being changed into a stone, fossilized. **pe′trology** – the study of stones and rocks. **′petrous** – like stone.

′Petri dish (′petri) – round glass container, as shown, used in growing bacteria on jelly. (Julius Petri, German, 1852–1921.)

PETRI DISH

′petro-chemicals – chemical substances which are made from the raw materials in petroleum.

pe′troleum (pe′trouliəm) – the natural mineral oil from which are obtained petrol, motor-spirit, gasoline, kerosene, paraffin, etc.

/-pexy (-′peksi) – fixing up into place by surgery, e.g. **′nephro′pexy** (′nefro-) – fixing a ↓floating kidney into place.

′pfleiderer (′flaidərə) – machine used to cut cellulose sheets into very small pieces, as part of the process of making artificial silk.

pH value (pii-eitʃ) – measure of the number of hydrogen ions (positively charged hydrogen particles) in a solution, and so a measure of how acid (or how alkaline) the solution is. For water (neither acid nor alkaline) the *p*H value is 7: smaller numbers show more H ions (acid); bigger numbers, up to 14, show fewer H ions (alkaline). The *p*H of good wheat-land is 6–8: land for orange and other fruits 5–7. ↓hydrogen-ion concentration.

′phaco-/ (fæko-) lens, e.g. **′phacolite** – mineral which forms lens-like crystals.

phae/-o-/ – dark coloured, e.g. **′Phaeo′phyta** (fai.o′faitə) – brown seaweeds.

phag-o-/ – eat, e.g. **′phagocyte** (′fægosait) – blood cell which destroys ("eats") foreign Bodies, e.g. bacteria. **/-phage** (feidʒ) – thing which "eats" (destroys), e.g. **bacteriophage** – ↓virus which destroys bacteria.

′phalanx (pha′langes) (′fælæŋks, -′ændʒiiz) – finger-bone(s), 14 in each hand; also toe-bones.

′phallus (′fæləs) – male sex organ.

′phanero-/- (′fænəro-) – which can be seen, e.g. **′phanero′gamae, /-gams** – plants which produce flowers in which the organs of reproduction can be easily seen, that is, all flowering plants and ↓conifers; opposite of

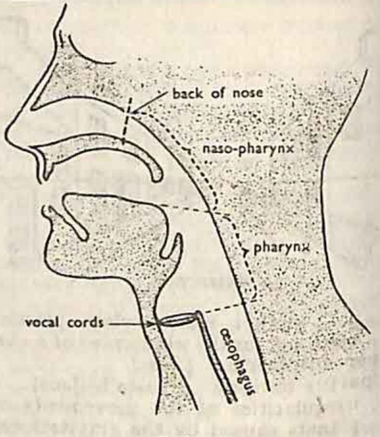
↓ cryptogams (= non-flowering plants).

'phantasy ('fæntəsi) – day-dream, group of unreal imaginary ideas, e.g. "If I were king . . ."

'phantom ('fæntəm) (of ↓ gyro compass) – frame round the gyro-compass of a ship. When the ship turns, the phantom turns, but the gyroscope goes on pointing north; so the phantom is out of line with the gyroscope. A motor is automatically set going to bring the gyroscope back to position. The amount of movement in the phantom in getting back to position is sent out electrically to all the Repeater Compasses in different parts of the ship, causing them to move so that they show the angle of the ship's turn.

'pharma'cology ('faamə'kɔlədʒi) – scientific study of drugs. **'pharmaco'poeia** (-ko'piiə) – list of drugs with their doses (amounts to be used) etc. – prepared by an official committee. **'pharma'ceutical** ('faamə-'sjutikəl), adj.

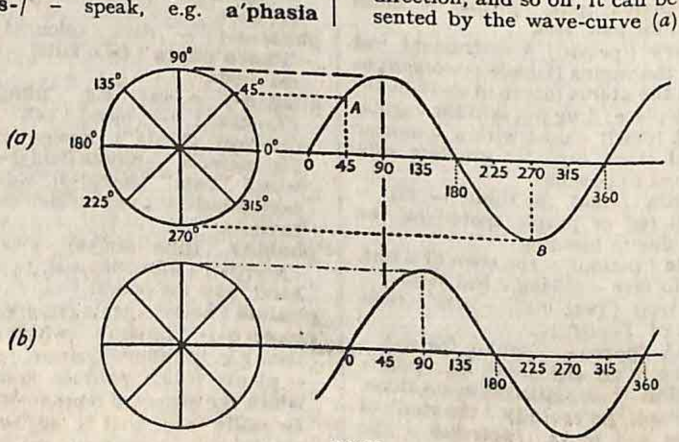
pharynx ('færiŋks) – food-passage and air-way from the back of the mouth to the point when the air-way and food-way divide, at the ↓ oesophagus. The **naso-pharynx** reaches from the back of the septum (dividing plate of the nose) to the back wall of the pharynx.



PHARYNX

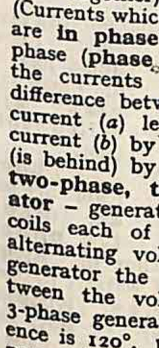
/-phas-/ – speak, e.g. **a'phasia** (ə'feiziə) – loss of the power of speech.

phase (feiz) – state of (or position of) a Body or quantity which passes over and over again through a series of changes, e.g. **phases of the moon** – the changes in the shape of the moon, as seen from the Earth, due to its motion round the Earth; (*electricity*) – An alternating quantity (e.g. electric current) increases to its greatest strength in one direction, decreases again, increases to its greatest strength in the opposite direction, and so on; it can be represented by the wave-curve (*a*). Any



PHASE

point on this curve can be described by giving the size of the angle as shown by the circle on the left, i.e. the phase (state) of the current can be described by giving an angle (the **phase angle**). The phase of the current at *A* is 45°; at *B* it is 270°, etc. Curve (*b*) shows another alternating current of the same frequency but it reaches its greatest strength later than the current shown in (*a*). These currents are "out of step" (not together) = **out of phase.** (Currents which are exactly together are **in phase.**) The difference of phase (**phase difference**) between the currents is described as the difference between the angles, e.g. current (*a*) leads (is in front of) current (*b*) by 45°; current (*b*) lags (is behind) by 45°. ↓power factor. **two-phase, three-phase generator** – generator with 2, 3 sets of coils each of which produces an alternating voltage. In a 2-phase generator the phase difference between the voltages is 90°; in a 3-phase generator the phase difference is 120°. **polyphase** – general name for 2, 3 or more phase.



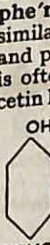
PHASE DIFFERENCE METHOD

phase contrast method, phase difference method – way of making very transparent solids (e.g. parts of a living organism) show up more clearly under a microscope. *O* is the object (thing looked at): *L* is the lens: *P* is a plate with a piece cut away so that it is thinner in one part. The light rays *AA* are focused (brought to a point) on the thin part of the plate. The light rays *BB* which pass through the substance (e.g. cell, tissue, etc.) are delayed. (They may be thought of as new rays starting out from the object.) They pass through the thicker part of the plate and so are delayed again. This puts them so much out of *phase with the light *AA* that there is ↓interference between the *BB* rays and the *AA* rays. This interference causes the tissue (etc.) to show as grey: *(see Phase just above).

phase rule – Example: In a container there is water and water vapour "in equilibrium" (= in a steady state) so that the amount of vapour does not become more or less. Here we have one Component C (kind of substance – water) and two Phases P (two states or parts of it). We can have this arrangement at any temperature we choose (if the temperature is raised to a chosen new value, the pressure of the vapour must rise to a certain new value); we can have this arrangement at any pressure we choose (if the pressure is raised, the temperature must have a certain new value); so we have one choice = one Degree of Freedom, F. This agrees with the Phase Rule; the Phase Rule says that number of degrees of freedom = number of components – (*minus*) number of phases + 2, i.e. F = C – P + 2. In the example 1 = 1 – 2 + 2. If, for example, we have an equilibrium mixture of ice, water, and water vapour, C = 1, P = 3, so F = 1 – 3 + 2 = 0, i.e. we have no choice; we can only have such a mixture at a certain temperature (0·0076° C.) and pressure (4·67 mm.).

phell-/-o-/ (fel) – cork, the soft outer covering of a tree. **'phellum** – the cork layer of a plant or tree.' **phellogen** (-dʒen) – the layer of cells in a plant which produce the cork.

phen-/ – having to do with ↓phenol or having the ↓phenyl group, e.g. **phe'nacetin** (fi'næsi-tin) – drug similar to aspirin, used for headache and pain; caffeine (drug from coffee) is often combined with it as phenacetin has a slowing effect on the heart.


PHENOL

'phenol ('fiːnɔl) – carbolic acid; C_6H_5OH; colourless crystals; a strong disinfectant. **phenols** – substances containing from 1 to 4 –OH groups joined direct to a benzene ring (not to another group of atoms joined to a benzene ring). They act like alcohols (e.g. can form ↓esters with acids); but also act as weak acids, forming 'phenates with alkalis, e.g. sodium phenate, C_6H_5ONa. **phe'nolic acids** – acids which also have an –OH group joined to a benzene ring, e.g. ↓salicylic acid.

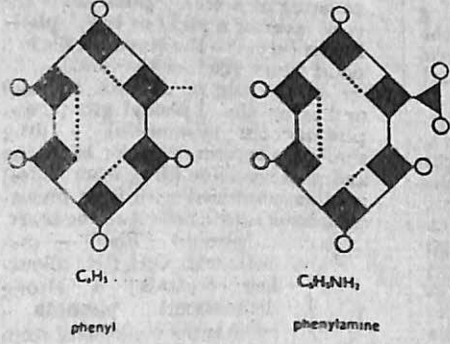
'phenolic resins – plastics made with phenol, e.g. **phenol-formaldehyde** plastics, thermo-setting (not changing shape after the first heating), e.g. Bakelite also ↓resoles. The way in which phenol and formaldehyde join into chains is shown in the diagram of ↓Bakelite.

phe'nology (fe'nɔlədʒi) – study of the effect of climate (weather) on plants and animals.

'phenol'phthalein ('fiinɔl'fθæli.in) – substance whose solution is red with alkalis, but colourless with acids. Used as an indicator to show whether a liquid is acid or alkaline; also in medicine to cause action of the bowels.

'phenotype ('fiinotaip) – one of a group of individuals which have qualities in common and are apparently alike (resulting from certain hereditary qualities and environment). ↓genotype.

'phenyl ('fenil) – the group C_6H_5– (benzene ring less one hydrogen atom), e.g. 'phenyl'amine, $C_6H_5NH_2$ (commonly called aniline).



C_6H_5 phenyl

$C_6H_5NH_2$ phenylamine

PHENYL

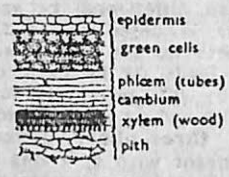
'phenyl'alanine – an ↓essential amino-acid.

/-philic (-filik) – readily combining with, e.g. **'hydro'philic** (substance) – which takes up water, easily dissolves in water. **lyophilic**, ↓lyo-/.

/-'philous (-'filəs) – loving, liking to be in, living in, e.g. **'hydro'philous** – living in water.

phleb-/-o-/ (fleb-) – vein, e.g. **phle'bitis** – inflammation of the walls of the veins and (often) clotting of the blood in the veins.

'phloem ('flouem) – that part of a plant which carries liquid food up or down the plant; also called (soft) bast.



PHLOEM

/-'phobia ('foubiə) – fear, e.g. **'claustro'phobia** – fear of being shut in. **'hydro'phobia** – fear of water (↓rabies).

/-phobic – fearing, e.g. ↓lyophobic.

'phobo-/ ('fɔbou) – fear, e.g. **'phobo'taxis** – movement made by an animal so as to draw back from danger.

phon (fɔn) – unit in measuring loudness of noise. The scale of phons is such that 10 phons more means 10 *times* as loud, 20 phons more means 10 × 10 = 100 times as loud, and so on. Quiet whisper = 10 phons; quiet street = 30; noisy train = 90; inside noisy aeroplane = 110. The loudness of a sound in phons is the same number as the strength of an equally loud pure note (of frequency 1,000 cycles per second) in ↓decibels. ↓Weber-Fechner.

'phonons ('founɔnz) – those vibrations of the atoms of a crystal, due to their heat energy, which can be treated mathematically as if they were sound waves.

/-phore (fɔɔ) – (1) part which carries . . . e.g. **'sporophore** – part which carries (supports) the spores in a fungus; (2) substance which produces . . . e.g. **'chromatophore** – colour producing substance of a cell in a plant; group of atoms which causes the colouring power of certain dyes, e.g. –N:N–.

/-pho'resis (-fɔ'riisis) – ("carrying") – (1) electrically caused movement of particles in a ↓colloid (jelly-like substance), e.g. **'cataphoresis** – such movement towards the cathode (negative electrical plate); it is used in medicine to cause a drug to enter the body; so also **anaphoresis** – such movement towards the anode (positive electrical plate); (2) (in medicine) – sweating, e.g. **diaphoresis; 'diapho'retic** – (drug) which produces sweating. (**Anaphoresis** means lessened activity of the sweat glands.)

'phosgene ('fɔzdʒiin) – colourless poisonous gas, $COCl_2$; used in dye-making.

'phosphates ('fɔsfeits) – salts of **phos'phoric acid** (H_3PO_4). **phosphate fertilizers** are used to help root-growth.

'phosphides ('fɔsfaidz) – compounds produced by direct union of phosphorus with a metal, e.g. aluminium phosphide, AlP; calcium phosphide (Ca_3P_2) catches fire in water, used for making signals at sea. **'phosphine** – colourless gas (PH_3) which catches fire in air.

'phosphites – salts of ↓phosphorous acid.

'phosphor bronze – alloy of copper, tin, phosphorus; used for bearings, e.g. in motor cycles, gears, etc.; also in parts of a ship which are touched by sea-water.

'phospho'rescence ('fɔsfə'resns) – ↓Ultra-violet light which we cannot see (and other rays) cause certain substances to give out light which can be seen; these substances are **fluorescent.** Phosphorescent substance gives out light *after* the cause (the rays) has ceased. (Certain animals, e.g. fire-flies, give out a similar light by combining body-substances with oxygen; but this is rather a process of slow-burning – not phosphorescence.) ↓luminescence.

'phosphorous acid ('fɔsfərəs -) – H_3PO_3, formed from **phosphorous oxide** (P_2O_3) and water.

'phosphors – ↓fluorescent substances used for the coating of cathode-ray tubes, e.g. television tubes.

'phosphorus ('fɔsfərəs) – non-metal element; used in making matches. White (yellow) phosphorus catches alight in warm damp air (about 30° C). Phosphorus is always being taken away from farm-land (in the bones of animals fed on the land but killed and used elsewhere); for this reason ↓phosphate fertilizers are used to put the phosphorus back.

phot (fout) – unit for measuring the degree of brightness at which a surface is lit: = the brightness of a surface which is 1 centimetre from a standard ↓candle. (1 phot = 10,000 ↓lux.) At one yard distance from a 40-candle-power electric bulb (as on a reading-lamp) the brightness would be about $\frac{1}{250}$ phot.

'photo-/ (fouto-) – of light, e.g. **photograph.**

photo-cell = ↓photoelectric cell.

'photo-'chemistry – the part of chemistry which deals with the effect of light on substances, as in photography and in photo-chemical cells.

'photo-'chemical 'cell – If light falls on one of two metal plates (e.g. silver) in a solution, an electric pressure (voltage) is set up, so that an electric cell is formed. Also called photo-electrolytic cell.

photo-conductor – substance (e.g. selenium) whose power of conducting electricity increases when light falls on it.

'photo-e'lastic 'stress-analysis – Stressed material = material which is being pushed, or pulled. Polarized light = light waves all in one plane. When polarized light is passed through a plastic model of a stressed Body, the stressed parts affect the speed of the light so that the tops of some waves meet hollows of others, so causing dark lines. These dark lines show just where the lines of stress are (and so the Body may in future be made extra strong at those places).

'photo-electric cell – in general, any instrument which responds to light (or infra-red or ultra-violet rays) by producing a change in an electric current. (1) a cell which lets a current flow in a circuit by sending out electrons from a metal plate (**photo-emitter**) when light falls on it (see diagram). (2) a cell in which light falls on a metal conductor, alters its resistance, and so allows a bigger current to flow. (3) a ↓photo-voltaic cell. Used to produce sound from the sound-track of a cinema film, and for many other purposes, e.g. light measurer for photography, fire-alarm, counting (packets) coming from a machine, safety instruments in factories.

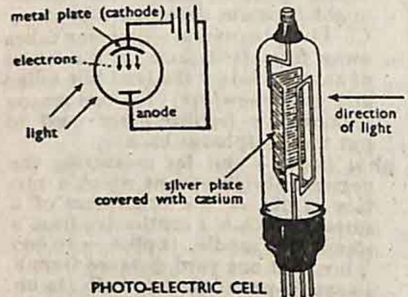


PHOTO-ELECTRIC CELL

photo-electric effect, photo-emission – the loss of electrons from an insulated metal surface when light (especially ↓ultra-violet light) falls on it: also called Hallwach's effect.

photo-electrolytic cell – ↓photo-chemical cell.

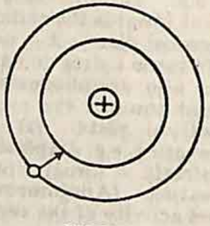
'photo'genic ('fouto'dʒenik) – (1) (face, person) suitable for use in cinema films; (2) (bacteria) – producing light.

'photo'gravure ('fouto'greiviə) – process of printing pictures etched on (made of lines cut down into) a copper-plate. The picture is first printed on to the plate from a photographic film.

pho'tometer (fo'tɔmitə) – instrument for measuring or comparing the intensity (strength) of light from different sources.

'photo-multiplier – a photo-emitter (↓photo-electric cell) in which the electrons sent out by the plate cause another plate to send out further electrons (↓secondary emission) so that a stronger current is produced.

'photon ('foutɔn) – particle of light. In some ways (e.g. ↓photo-electric effect) light behaves as if it consists of particles, not of waves. Each photon carries a fixed amount of energy according to the frequency of the light: (↓Planck). The atom consists of a nucleus ⊕ in the centre with a number of electrons ⊖ revolving at various distances from it. An electron in an outer orbit has more energy than one in an inner orbit: when an electron passes inwards from an outer to an inner orbit, it emits (sends out) the difference in energy as a photon.



PHOTON

'photo'periodism of plants (-'piəridizm -) – the effect of length of day and night on the flowering of a plant. Wheat, lettuce (salad), beetroot (e.g. sugar-beet) are long-day plants; they flower if they get 14–16 hours of sunlight a day. Rice, French beans, primula are short-day plants; they flower if they get 8–9 hours of daylight. The length of the darkness is also important.

'photo'phobia ('fouto'foubiə) – fear and dislike of light, turning the eyes away from light, as in ↓measles and inflammation of the eye.

'photosphere ('foutosfiə) – the bright surface of the sun as seen without a telescope. It is, in fact, a thin layer between the dense gases of the inner part and the less dense gases of the sun's atmosphere. The temperature of the atmosphere is about 6,000° C. (11,000° F.). It has a grain-like appearance with irregularly shaped bright areas. ↓faculae.

'Photostat ('foutostæt) – trade name for a method of making photographic copies of drawings, etc.

·'photo'synthesis ('fouto'sinθəsis)

building up of sugars and starches (from carbon dioxide and water) in the green cells of a plant by means of ↓chlorophyll, in the presence of sunlight.

phototaxis – ↓/-taxis.

photo-transistor – form of ↓transistor such that, when light falls on it, the resistance which it has to the flow of current is much reduced.

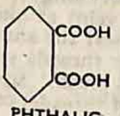
'photo'tropic (-'trɔpik) – moving or bending towards or away from light, e.g. plant stems grow towards the light.

photo-voltaic cell – (1) = ↓photochemical cell; (2) (More often) a join between two different materials (e.g. copper, copper oxide) which produces electric power (like a battery) when light falls on it.

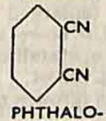
photo-zinc – ↓zinco.

'phreni-/ ('friini-) – having to do with the diaphragm (the muscular wall at the base of the lungs whose movement causes the lungs to expand). **'phrenic nerve** – the nerve supplying the diaphragm.

'phthalic acid (fθælik) – an acid with the formula shown; important in dye-manufacture. Four molecules of **'phthalo'nitrile** united with one atom of a metal (e.g. copper) form **'phthalo'cyanines,** an important group of blue/green colouring matters very resistant to sun and chemicals. **'di'methyl'phthalate** is used to keep insects away.



PHTHALIC ACID



PHTHALO-NITRILE

'phthisis ('θaisis) – tuberculosis, consumption (disease of the lungs).

'Phycomy'cetes ('faikomai'siitiiz) – one of the two big groups of fungi; it includes the lower kinds whose fibres have no cross-walls inside. The group is divided into ↓Oomycetes (e.g. fungus which causes Potato disease) and ↓Zygomycetes (e.g. fungus of the Black Mould on bread).

-phy'lact (-fi'lækt) – guard, e.g. **'prophy'lactic** – (substance) which guards a person against a disease. ↓anaphylactic.

'phyllo-/ ('filo-) – leaf, e.g. **'phyllo'clade** – a flattened stem which looks like, and acts like, a leaf. **'phyllo'taxis** – the arrangement of leaves on a stem.

'phylo-/ ('failo-) – race. **'phylo'genesis, phy'logeny** – the development of a race. **'phylon** – a line of descent. **'phylum** – a main group or class of animals (or plants), e.g. Arthropods (creatures with jointed limbs); Chordata (group of animals with a spinal cord – which includes man).

'physical optics ('fizikəl-'ɔptiks) – that part of the study of light which deals with effects (e.g. ↓interference) which are best explained by thinking of light as consisting of waves or particles. In ↓geometric optics light is thought of as rays.

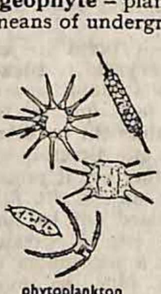
'physiology ('fizi'ɔlədʒi) – the study of the way in which the body of any organism (e.g. man) carries out its work.

'physio'therapy ('fisio'θerəpi) – medical treatment with light, heat, electricity, and other natural forces.

'physo'stigmine ('faiso'stigmiin) – a substance which acts on the ↓parasympathetic nerve system (the automatic nerve system which, in general, is in charge of building up the body and preparing for future, not immediate, needs). Physostigmine helps in slowing down the heart, and in increasing movement of the bowels. It also causes contraction of the pupil of the eye. Also called Eserine.

/-phyte (-fait-), **/-phyta** – plant, e.g. **'geophyte** – plant which spreads by means of underground buds; **'Spermato'phyta** – the large class of plants which reproduce by seeds; **'Pteri-do'phyta** – the large class of plants which includes the ferns.

'phyto-/ ('faito-) – of plants, e.g. **'phyto'plankton** – ↓plankton which consists of plants.



phytoplankton

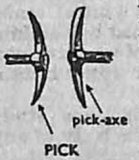
PHYTO—/

Phy'tophthera infestans – fungus which causes *blight in potatoes: *(disease causing the potato to turn brown, decay and die – as in Ireland in 1846).

pi (pai) – the ratio of the circumference of a circle to its diameter: = about $\frac{22}{7} = 3{\cdot}14159\ldots$; written π (Greek letter Pi).

'pia-'mater ('paiə-'meitə) – membrane covering (touching) the brain and spinal cord: it consists of a network of small blood-vessels.

pick – tool for digging up roads, pointed at both ends. A **'pick-axe** has one point and one flat (cutting) end. **pick** – one of the cross-threads on a loom. **picking** – throwing the shuttle (thread-container) across between the warp (long) threads in weaving.



'pico-'farad ('piiko-'færæd) – very small unit of ↓capacitance equal to one million millionth of a farad.

'picric 'acid ('pikrik-) – yellow substance made from phenol and nitric acid; used in making explosives and dyes: $(C_6H_2.(NO_2)_3.OH)$.

pier (piə) – a support (e.g. pillar); a piece built out from a wall to give extra support to a beam; solid wall between doors and windows; landing-stage (for ships) built out to sea.

/-pi'esia, pi'esis (-pai.iisiə, pai.'iisis) – ("press"): blood pressure, e.g. **hyperpiesis** – excessive blood pressure.

pi'ezo-/- (pi'ezo-) – ("press") – e.g. **piezo-electric crystal, piezo-electric effect.** – Certain crystals (**piezo-crystals**) (e.g. quartz, Rochelle salt, tourmaline cut to certain shapes) expand in one direction and contract in the other (as if pressed out) when put in an electric field. So also when pressed out by force they produce an electric pressure (voltage). Thus in a microphone the varying pressure (due to sound waves) can, by a piezo crystal, be changed into electrical impulses. A piezo-crystal has its own natural rate of expansion and contraction; if an oscillating (rapidly alternating) current is made to act on it at its natural rate, the crystal can be made to keep the oscillation exact: this is used in electrical clocks for very accurate work, e.g. astronomy and to control the rate of working of a digital ↓computer. Electric action on the crystal may be used to produce supersonic waves (sound waves more frequent than those which can be heard) as used, e.g., in Asdic.

pig – a mass of metal as supplied for melting, rolling, alloying, etc., e.g. **pig iron** – mass of iron as first produced from the ore, cast into shapes for carrying to the user.

'pigment – colouring matter, as in paint, as in the hair, skin, eyes.

/-pil-/ (-pil-) – hair, e.g. **pilose** (leaf) – hairy; **de'pilatory** (substance) – used to remove hair.

'pilaster ('pilæstə) – square pillar standing out from the face of a wall.

pile (pail) – (1) post driven into the ground as a base for building; (2) haemorrhoid (enlarged vein) at the lower end of the bowel near the anus (outlet); (3) upstanding threads on cloth (e.g. ↓velvet, ↓plush): upstanding tufts (groups of threads) on a carpet.

'pileus ('pailiəs) – the rounded top part of a mushroom or similar fungus.

'pilo'carpine ('pailo'kaapiin) – drug obtained from **'jabo'randi** ('dʒæbə-'rændi) (leaf of a S. American plant): it causes redness of the skin and sweating; used to help the kidneys by getting rid of waste matter through the skin instead of by urine.

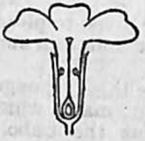
'pilot plant ('pailət -) – small group of machines as in a factory used to test how a new manufacturing process works, and how it may be made better.

pinch effect (pintʃ -) – When a very large electric current is passed through a gas, the magnetic effect of the current "pinches" (squeezes) the gas into a narrow rod-shaped mass. Used in ↓thermonuclear experiments.

'pineal body ('painiəl -) – small red outgrowth from the roof of the brain;

its function (work, use) is not known. For picture see pituitary.

pin-eyed – having the middle of the flower almost filled by the pin-shaped top of the pistil (female part) with the stamens (male parts) lower down, e.g. Primrose. ↓ thrum-eyed.


PIN-EYED

'pinion ('pinjən) – small gear - wheel: small toothed wheel driving or driven by a larger wheel, e.g. in a clock.

pink eye – infectious disease of the outer membrane of the front of the eye.

'pinna ('pinə) – feather, feather-like thing; wing of a bird: fin of a fish: outer ear, e.g. of man, dog, horse, etc.

'pinnace ('pinəs) – open boat about 30 feet long.

'pinnate ('pineit) – shaped like a feather. **pinnate leaf** – having small leaves (**pinnae**) arranged in rows on each side of the main leaf stem.

PINNATE LEAF

'pinta – fungal disease of the skin which destroys the colouring matter.

'pintle (pintl) – pin on which something turns, e.g. the pin in a hinge; a hook of the rudder of a boat: ↓ goodgeon.

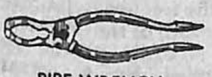
pin-vice – handle with chuck (= screw as on a drill) used to hold any small tool.

PIN-VICE

pi'pette (pi'pet) – glass tube with a measuring mark: liquid is sucked up into it as a way of measuring off or moving small amounts of liquid.

PIPETTE

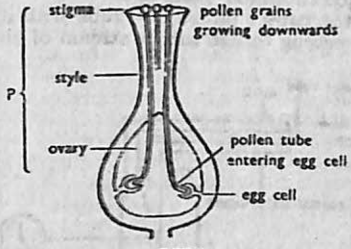
'pipe-wrench ('paip-renʃ) – tool as shown for holding and turning (e.g. screwing up) pipes.


PIPE-WRENCH

'piqué ('piike) – cotton cloth with raised cross-threads from edge to edge, as in a man's white evening-tie.

pisci-/ (piski-) – fish, e.g. **pis'civorous** – fish-eating.

'pistil ('pistil) – the female part of a flower consisting of (1) the ovary (containing the unfertilized seeds), (2) the stigma, (on to which the male cells come), and (3) the style (stem which joins stigma and ovary).

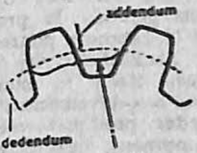

stigma
pollen grains growing downwards
style
P
ovary
pollen tube entering egg cell
egg cell
PISTIL

'piston ('pistən) – the close-fitting block which moves backwards and forwards in a cylinder: for picture, see cylinder. **piston-ring** – circular spring which partly fits into a groove cut in the piston so as to make a gas-tight joint.

pitch (ship) (pitʃ) – move up and down in an endway direction (not side to side = roll).

pitch – black easily melted substance used in making waterproof surfaces or joints.

pitch – (1) the height (sound-waves per second) of a musical note; (2) the distance apart of the thread of screws; (3) the distance from a certain point on one gear-tooth to the same point on the next gear tooth: this measure is made along the **pitch-circle** (the dotted line in the diagram showing where the teeth press each other); (4) the angle of the blades of the propeller of an aeroplane.



PITCH

'pitchblende ('pitʃblend) – uranium oxide, the ore in which radium was discovered.

pith (piθ) – soft centre of a plant- or tree-stem. **pith a frog** – kill by driving a pin into the spinal cord.

pi'thec-/ (piθik-) – ape (e.g. gorilla, ourang, etc.). **Pi'thecan'thropus** – the ape-man whose fossil remains were found in Java; he lived about 400 thousand years ago.

'pitot tube ('piitou -) – tube with its opening turned into a stream of air, or water so as to measure the force of the flow. Used in the speed-measuring instrument of an aeroplane.

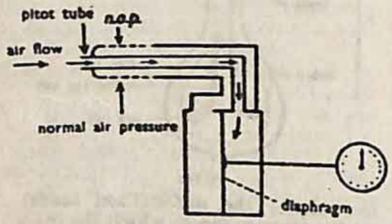
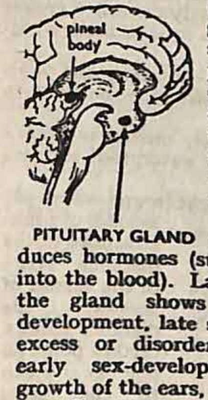


diagram of PITOT TUBE

pi'tuitary body, - gland (pi'tjuuitəri -) – gland about the size of a large pea at the base of the brain just above the roof of the mouth; it has a general controlling power over all the ↓ endocrine glands. It produces hormones (substances poured into the blood). Lack of activity of the gland shows itself in slow development, late sex-development; excess or disorder produces very early sex-development, excessive growth of the ears, nose, jaw, hands, feet; disease causes the early appearance of old age.



PITUITARY GLAND

pi'tuitrin – one of the substances produced by the pituitary gland: it causes contraction of the ↓ uterus in childbirth.

pity'riasis (piti'raiəsis) – (*pityr-* = bran = outer woody layer of grain, as taken out from flour) – disease causing a bran-like surface of the skin.

pix – brown-black liquid from coal or wood, tar.

pla'cebo (plæ'siibo) – ("I will please") – a medicine given to please the sick person rather than as a cure for the disease.

pla'centa (plæ'sentə) – thick, sponge-like mass which joins the unborn child to the mother; (human about 8 × 1 inch); in it the blood of the child receives food substances from the mother, but there is no actual exchange of blood: – of a plant – part of the ovary (container) to which ovules (unfertilized seeds) are fixed. The little stem left behind when a pea or bean is taken from the pod is the placenta. **'placenta 'praevia** – state in which the placenta is below (in front of) the unborn baby, and so tends to come out from the mother first, so causing the death of the baby at birth.

PLACENTA

'placer de'posits ('pleisə -) – surface deposits of metals (gold, etc.) e.g. made by a river.

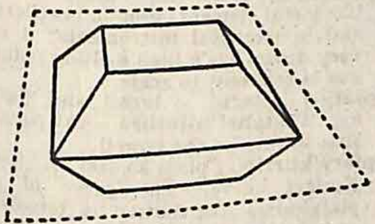
'plagio-/ ('plædʒio -) – slanting at an angle, e.g **pla'gio'cephalic** – with the head twisted at an angle. **'plagio'clase** – ↓ feldspar minerals containing sodium or calcium silicates: the crystals split in two directions at an angle.

plain weave – calico, tabby weave – simplest form of weaving; under – over – under – over – . . .

Planck's constant (plæŋks -) – The amount of energy in a stream of radiation (e.g. of heat, light) must be exactly so many times a certain amount of energy called a quantum. The size of a quantum of energy depends upon the frequency (number of waves per second) of the radiation; the quantum is equal to the frequency multiplied by a certain *number. This number, usually written *h*, is Planck's constant: *(6·547 × 10^{-27} erg-second). ↓quantum.

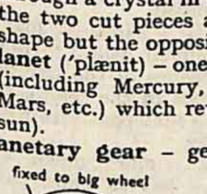
plane (plein) – (1) tool, as shown, used for smoothing wood; (2) flat surface: **in one plane** – in one flat surface, not at various angles; (3) surface of an aeroplane which acts on the air, e.g. tail-plane. **plane of 'symmetry** (- 'simitri) – surface cut through a crystal in such a way that the two cut pieces are of the same shape but the opposite way round.

PLANE


PLANE OF SYMMETRY

'planet ('plænit) – one of those Bodies (including Mercury, Venus, Earth, Mars, etc.) which revolve round the sun).

planetary gear – gear-wheel which goes round another gear-wheel (roughly as a planet goes round the sun). In the diagram the planetary gear-wheel is moved backwards and forwards by a piston; it moves round the middle gear-wheel (which is fixed to the big wheel) and so turns this gear-wheel and the big wheel.



PLANETARY GEAR

plane-tabling – way of drawing a map of a small area; a North-South line is drawn on the board and the board is set North-South; a measured base is drawn to scale; lines are drawn from both ends of the base towards various points (instead of measuring angles).

pla'nimeter (plæ'nimitə) – instrument for measuring the area of a closed curve. A needle on an arm is moved round the curve and the area is shown on a scale.

'planishing ('plæniʃiŋ) – flattening a piece of sheet-metal by hammering, e.g. flattening out the edges where a hole has been cut.

'plankton ('plæŋktɔn) – very small animals and plants floating in the water, on which fishes feed. **'phyto-'plankton** – plankton compound of small plants. **'zoo'plankton** (zo.ou-) –plankton composed of small animals.

'plano-/ ('plæno-) – wandering, moving freely, not tied down, e.g. **'planoblast** – a free-swimming medusa: ↓obelia.

plano-/ (pleino) – flat, e.g. **'plano-'convex lens** – lens which has one side flat and the other curved outwards.

Plan-Position-Indicator – First see radar. A radar-beam moving round and round shows on a screen inside a ship a continuous plan (map) of the surrounding land, etc., as the ship moves forward. The instrument which does this is a P.P.I.

plant (plaant) – all the machines, tools, buildings, etc., of a factory, railway, or engineering works.

'planta ('plæntə) – the sole (flat underpart) of the foot. **'plantar-reflex** – ↓Babinski. **planti-/** – e.g. **'plantigrade** – walking on the sole of the foot, e.g. as by Man.

/-plasm (plæzm) – substance of living things. **'proto'plasm** – the material of which living matter is made. **'cytoplasm** ('saito-) – the substance of which a cell is made, other than the **'nucleoplasm** – the substance of which the nucleus of the cell is made.

'plasma ('plæzmə) – (1) liquid of the blood in which the blood cells are carried; (2) a gas so hot (as in a star) that all its atoms have become ions. (The gas is then quite different from an ordinary gas.) **plasmoid** – a mass of such a gas.

Plas'modia (plæz'moudiə) – group of simple one-celled creatures, e.g. the parasite (injected into the blood by a mosquito) which causes malaria. **Plasmodium vivax** – the parasite of Benign Tertian (every 48 hour) fever.

'Plasmoquine – trade name for ↓Pamaquin.

/-plast (-plæst) – small mass of dense substance in a cell, having some special function (use) or character, e.g. **'chloroplast** – such a mass containing chlorophyll (the green substance of plants).

'plasterboard – sheets made of ↓gypsum between paper (or other material) used to make a lining for inside walls or ceilings, instead of plastering.

'plastic ('plæstik) – which can be moulded into shape, e.g. clay is plastic. **plastic deformation, plastic flow** – deformation (change of shape) which does not disappear when the force ceases.

'plasticizer ('plæstisaizə) – A solvent (dissolving liquid) is used to dissolve a plastic so that it can be moulded to shape: after the moulding is done, the solvent evaporates and the plastic sets hard. A plasticizer is a solvent (e.g. dimethyl-phthalate, triacetin) which *does not evaporate* but stays in the plastic making it remain flexible (bendable): e.g. without a plasticizer cinema film would be hard and stiff.

'plastics ('plæstiks) – substances such as Bakelite and other ↓condensed or ↓polymerized substances which, at some stage in their making, can be moulded into shape.

plastic surgery – reshaping or remaking lost or damaged parts of the body, e.g. of the face, by surgery.

'plastids ('plæstidz) – small dense Bodies in a cell which are centres of chemical activity, e.g. the chloroplasts (↓/-plast) of plants.

plastron ('plæstrɔn) – the breast-bone and the cartilages (easily bent tough substances) of the ribs.

/-'plasty (-'plæsti) – a surgical operation done to form or shape or change a part of the body, not to cut it away, e.g. **'thoraco'plasty** – operation to cause a lung not to fill with air so as to rest it.

plate (pleit) – picture printed separately from the book; metal sheet from which a picture is printed.

'plate glass – thick large sheets of glass as in shop-windows.

'platen ('plætən) – flat surface of a machine, e.g. on which the paper is put in a small printing machine.

'plating – covering a metal with a thin layer of another metal (e.g. by ↓electrolysis); (bacteria) growing bacteria on plates of jelly containing suitable food-substances.

'platinum ('plætinəm) – grey, silver-like metal element; used in jewellery and in electrical instruments; it is very dense, has a high melting point and is resistant to acids.

'platy-/ ('plæti-) – broad and flat, e.g. **'Platyhel'minthes** – flat parasitic worms (in the bowel).

'platy'kurtic ('plæti'kəətik) – See Normal curve. The curve of a platykurtic distribution is broader and flatter than that of a normal distribution, i.e. the measures are more widely spread.

/-plegia (-pliidʒiə) – paralysis, loss of power of movement owing to brain injury (e.g. because of the bursting of a blood-vessel in the brain), e.g. **'hemi'plegia** – such paralysis in one half of the body.

plei/-o-/ (plai-o) – more, much, e.g. **'pleimerous** – having more parts than is usual. **'pleion** – area in which temperature (or other weather element) is above the normal.

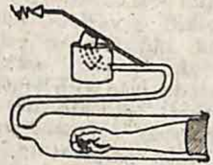
'Pleistocene period ('plaistosiin -) – the great ice-age, starting from about one million years ago, and lasting till the beginnings of life as now (100,000 to 200,000 years ago). There were four forward movements of ice from the Poles. The giant lizards of the earlier period disappeared. The beginning of life as it is today started towards the end of this period. The later part of the period is called Holocene.

'plenum ('pliinəm) – pressure above that of the atmosphere. **Plenum system** – method of heating buildings by driving in heated air.

pleo-/ (pliio-) – more, much, e.g. **'pleo'phagous** – (parasite) which lives on more than one kind of host plant.

plethora ('pleθərə) – state of having too much blood in the body (as in persons who eat too much).

ple'thysmo'graph (ple'θizmo'graaf) – instrument for measuring change in the size (volume) of a part of the body (e.g. arm) and so measuring changes in the volume of blood in it.



PLETHYSMOGRAPH

'pleura ('pluurə) – the membrane (**pleural membrane**) lining the **pleural cavity**: the lungs are pushed into (but not contained in) the pleural cavity. **pleurisy** – inflammation of the pleural membrane.

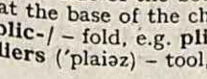
'pleuro-/ ('pluuro-) – in a sideways position, e.g. **'pleuro'carpous** – having the fruit on short side stems (not on the end of a stem) as in certain kinds of moss.

'pleuro'dynia ('pluuro'diniə) – pain in the muscles of the chest wall – as when running and "getting a stitch".

'plexus ('pleksəs) – a network, e.g. **'solar 'plexus** – network of nerves close to the spine, level with (on the other side of the body) the Λ angle at the base of the chest.

/-plic-/ – fold, e.g. **plicate** – folded.

'pliers ('plaiəz) – tool, as shown, used for holding and bending wire, etc.



PLIERS

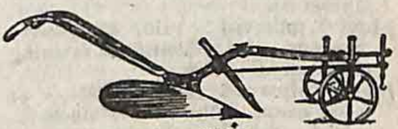
'Pliocene period ('plai.-osiin) – period before the Pleistocene (Great ice age) period. There was much volcanic activity and mountain building (e.g. Yellowstone area of U.S.A.). The animals were similar to those of the Pleistocene period. The Pliocene period began 15 million years ago and lasted until about one million years ago. ↓ Pleistocene.

/-ploid (-plɔid) – the number of ↓chromosome sets in the nucleus of a cell, e.g. **haploid** – having a single set as in a reproductive cell, **diploid** – having a double set as in a body cell, **tetraploid** – having four times the haploid number of a normal plant (as in some cultivated plants).

'Plombière's 'douche ('plɔmbieəz-'duuʃ) – washing out the lower bowel by means of a tube put in to a distance of about six inches above the anus (outlet).

'plotting – drawing a plan or graph.

'ploughshare ('plauʃeə) – part of a plough as shown by the arrow just above R in the drawing.



PLOUGHSHARE

plum-/, pluma (**-ae**) (pluum, -ə, -ii) – feather(s). **'plumage** ('pluumidʒ) – all the feathers of a bird. **'plumose** – feathery.

plumb (plʌm) – straight up/down. **plummet** – lead block on the end of a **plumb-line** (string) used to get a straight upright side, e.g. in building.

plumb-/- lead, e.g. **plumbism** – lead poisoning.

plum'bago (plʌm'beigou) = ↓graphite.

'plumbing ('plʌmiŋ) – the water pipes (etc.) of a house.

plumb rule – board with a lead weight on a string hanging in a hole; used to get a straight up/down surface in building.

plumbum ('plʌmbəm) – lead.

plume (pluum) – feather.

'plummet ('plʌmit) – ↓plumb.

'plumule ('pluumjul) – the young shoot or bud in a developed (or in a growing) seed.

'plunger ('plʌndʒə) – bar driven down into a tube, e.g. in a force pump.

plur-/-i-/ (pluur-) – more, many, e.g. **'pluri'cellular** – made of many cells.

plush (plʌʃ) cloth (of cotton, silk or wool) with threads upstanding all over the surface; like ↓velvet but with longer upright threads.

plu'tonic rocks (pluu'tɔnik -) – rocks formed by the slow solidifying of large masses of melted rock deep in the Earth. The substance crystallized slowly under high pressure and so the crystals are large.

plu'tonium (pluu'touniəm) – a new element formed from uranium. Uranium 238 (↓atomic number 92) + one neutron → Uranium 239; less 1 electron → neptunium (atomic number 93); less a second electron → plutonium (atomic number 94). It is used in nuclear weapons and some ↓reactors.

pluvi-/ (pluuvi-) – rain, e.g. **pluvi'ometer** – instrument for measuring the amount of rain.

/-ply, 'plywood (plai-) – sheets of wood made of thin layers stuck together, each sheet having its grain (fibres) at right angles to the next: e.g. **three-ply** – such a sheet made of three layers.

pneum-/ (njum-) – air, e.g. **pneu'matic tyre** – tyre containing air. **pneu'matic motor** – motor driven by air. **pneu'matics** – scientific study of the weight, density, flow, etc. of air (and other gases).

p'neumo- n- ('njuumo-) – having to do with the lungs. **p'neumo'cocci** (-'kɔkai) – the bacteria which cause **pneu'monia** (-mouniə) – inflammation of the lungs. **p'neumon'ectomy** ('njuumən'ektəmi) – the removal by surgery of the whole of a lung. **p'neum(on)okoni'osis,/-coni'osis** (-kɔni'ousis) – inflammation of the lungs due to dust, e.g. in coal-miners and stone workers. **pne'umoperiton'eum** – air in the ↓peritoneum, so also **p'neumoperi'cardium. p'neumo'thorax** – putting air into the cavity in which one lung is, so that, when the cavity expands, the lung does not expand to fill it, and thus is given a rest so as to recover from e.g. tuberculosis.

/-pod (pɔd) – foot, e.g. **tripod** – a stand with three feet.

/-podium (-'poudiəm) – foot-like thing, e.g. **'pseudo'podium** – foot-like piece of the tissue pushed out by a simple organism (e.g. ↓amoeba) so as to enclose a piece of food or as a means of moving: plural, **/-podia.**

'podsol ('pɔdsɔl) – white-grey soil in a cold country where bacteria break down the vegetable matter very slowly, and the mineral salts are washed out.

/-poi'esis (pɔi.'iisis) – the making of –, e.g. **'haematopoi'esis** – the making of blood; adj., **poi'etic.**

'poikil-/-o-/ ('pɔikil) – various, not all of one kind, not regular, e.g. **'poiki'litic rock** – with small crystals of one kind mixed with larger crystals of another. **'poikilo'thermal** – having body temperature which varies with the temperature of the surroundings, e.g. frogs, snakes, fish, and other "cold-blooded" creatures.

point – measure of printer's type, 72 points = 1 inch. **points** – joining of two sets of railway lines with a movable part to send a train on to one line or the other.

'pointing – putting a layer of fine cement in the outer space between bricks to cover the softer cement or mortar used in between the bricks.

poise (pɔiz) – unit for measuring viscosity (stickiness) e.g. of oil. The viscosity of water (at 20° C.) is 1 centipoise; of olive oil, 81 centipoise: of glycerine, 735 centipoise: (centipoise = $\frac{1}{100}$th of a poise).

'Poisson's ratio ('puɔsɔnz -) – relation of decrease of thickness to increase in length of a stretched bar; e.g. if a metal bar 100 inches long, 1 inch across, is stretched, and stretch = $\frac{3}{4}$ inch, with decrease in thickness = $\frac{1}{400}$ inch:–

Stretch = $\frac{3}{4}$ inch in 100 inches
= $\frac{3}{400}$ per inch.
Decrease in thickness = $\frac{1}{400}$ per inch.
Poisson's ratio = $\frac{1}{400} \div \frac{3}{400} = 0{\cdot}33$.

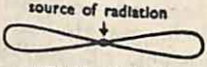
'polar body ('poulə -) – A growing body-cell divides into 2 equal parts; then into 4 equal parts, and so on. But a female sex cell (which becomes an ovum) divides into unequal parts – a full-sized cell (nucleus + surrounding cell tissue) and a small 1st polar body (a nucleus only). The cell forms a 2nd polar body and the 1st polar body divides. Thus there are three polar bodies. The polar bodies die and the cell becomes an ovum.

Thus only 1 in 4 female sex cells becomes an ovum.

polar bond – ↓polar valence.

'polar co-'ordinates – ↓co-ordinates.

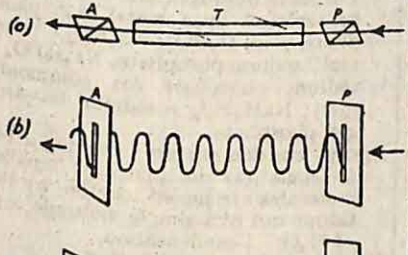
'polar 'diagram – diagram which shows how much radiation (e.g. especially radio waves) goes in different directions. In the diagram the radiation is strongest in two opposite directions and zero (nothing) in directions at right angles.



POLAR DIAGRAM

Po'laris (po'laaris) – The North Star.

po'lariscope (po'læriskoup) – instrument for showing the effects of polarized light. *P* is the polarizer (e.g. a ↓Nicol prism). It only passes light waves which lie in one particular plane (surface). *A* is the analyser. It lets all the light from *P* pass only if it is in a particular position. *T* is a tube of liquid or a piece of solid. We can think of *P* and *A* as cards with slits. In (*b*) the slits are parallel: the polarized light from *P* passes through *A*. If *A* is slowly turned, the light is gradually cut off, and when it has been turned 90° no light passes through it (diagram *c*). If, with *P* and *A* in these positions, *T* is filled with a liquid which twists the polarized light, some light now gets through. *A* must be turned further to cut it off (diagram *d*). The amount of extra turning shows the effect of the liquid on polarized light. An instrument specially made for accurate measurements of this kind is called a **pola'rimeter.**



POLARISCOPE

'polari'zation ('poulərai'zeiʃn) – the gathering of a chemical substance (e.g. hydrogen) round one of the plates of an electric cell so that the cell loses some of its power. **depolarizer** – substance added to remove the substance causing polarization.

'polarized light ('pouləraizd) – Light waves may be thought of as similar to the waves in a string fixed at one end and moved up and down at the other end. In an unpolarized beam of light there are many such waves (strings) at various angles to each other (e.g. some strings move up and down, some move side to side, etc.). In polarized light all the waves are parallel (as if all the strings pass through a narrow crack and those waves not parallel to the crack are shut off). Light is polarized, e.g. by passing it through a Nicol prism, or through a sheet of ↓polaroid. ↓polariscope.

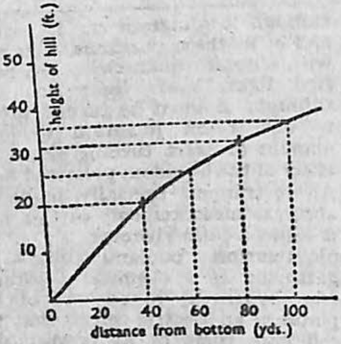
'polar 'molecule – a molecule which behaves as if one end were electrically negative and the other positive, e.g. hydrogen chloride: ⊕ H.Cl ⊖.

'polaroid ('pouləroid) – sheet containing crystals of a compound of iodine and quinine, used to ↓polarize light.

polar projection – ↓gnomonic.

polar 'valence, -cy – joining together of atoms in a molecule by giving an electron from one atom (so making it ⊕) to another atom (so making it ⊖): the atoms are held together electrically, because one atom is ⊕ and the other ⊖. Polar valency is also called electro-valency. (In co-valency the electrons are shared, not given.)

/-polate (-pəleit) – e.g. **in'terpolate** – fill in extra numbers in a series of



/-POLATE

figures (e.g. height of a hill, temperatures taken at regular times). See drawing. The height of the hill 40 yards from the bottom is known to be 20 feet, at 80 yards to be 32 feet. The height at 60 yards can be interpolated – 26 feet. The height at 100 yards can be **extrapo'lated** – the measure added outside the known set of measures – 36 feet.

'polder ('pouldə) – low land reclaimed (got back into use) by keeping the water off it.

poles of a magnet (poulz -) – points or small places near each end of a magnet where the power of attracting pieces of iron or steel is greatest. If a magnet can turn easily, the **north-seeking pole** (north pole) points to the north (nearly); the **south-seeking pole** (south pole) points to the south (nearly). **Unit magnetic pole** – the strength of a pole of a magnet is described as so many **unit poles**: a unit pole acts on another unit pole one centimetre away in a vacuum with a force of one ↓dyne.

'polio-/ ('poulio-) – grey, e.g. the grey matter of the brain and spinal cord. **'poliomye'litis** = "infantile paralysis" – inflammation of the grey matter of the spinal cord (*myel-/*) – an infectious disease causing destruction of the nerve-cells supplying certain muscles. The organism which causes poliomyelitis is a ↓virus; it is found in the faeces (matter from the bowels); it is not known how it enters the body; the disease attacks grown persons as well as young children (infants).

'pollen ('pɔlən) – flower-dust carrying male cells. **pollination** – the carrying of pollen to the female part of a flower – first step of fertilization.

'pollex ('pɔleks) – thumb or big toe.

po'lonium (pɔ'louniəm) – radioactive element which changes into lead.

poly-/ (pɔli-) – many, e.g. **po'lygamous** (animal) – which has more than one mate (husband/wife) in a season.

'poly-/ – ↓polymer of – e.g. ↓polythene (polyethylene, a polymer of ethylene), polystyrene, poly-ester (e.g. Terylene), etc.

'poly'basic ('pɔli'beisik) – acid having 2 or more hydrogen atoms which can be replaced by a metal, e.g. phosphoric acid, H_3PO_4; Na_3PO_4 – "normal" sodium phosphate; Na_2HPO_4 – sodium phosphate (as commonly met); NaH_2PO_4 – sodium dihydrogen phosphate.

'poly-'conden'sation – making a big molecule (as in plastics): smaller molecules are joined together by the taking out of a simple molecule (e.g. of H_2O). ↓condensation.

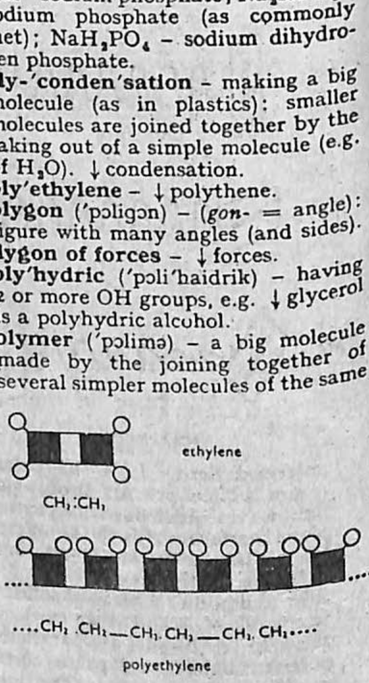
'poly'ethylene – ↓polythene.

'polygon ('pɔligɔn) – (*gon-* = angle): figure with many angles (and sides).

polygon of forces – ↓forces.

'poly'hydric ('pɔli'haidrik) – having 2 or more OH groups, e.g. ↓glycerol is a polyhydric alcohol.

'polymer ('pɔlimə) – a big molecule made by the joining together of several simpler molecules of the same



POLYMER

kind. **po'lymerize** – to join together . . .; **'polymeri'zation** – the process of joining together several simple molecules of the same kind to form a bigger molecule. The word is mostly used to describe the joining of simple carbon compounds to make a long chain as in plastics. Thus ethylene, $CH_2:CH_2$, polymerizes to form the chain $-CH_2-CH_2CH_2$ . . .

'poly'morphic ('pɔli'mɔɔfik) – having different forms, e.g. titanium oxide forms three differently shaped crystals.

'polymorph – the commonest form of white blood-cell: they destroy bacteria which get into the body, e.g. through a wound.

'polyp ('pɔlip) – ↓ obelia.

'poly'peptides – compounds, consisting of chains of 2 or more (e.g. 18) ↓ amino-acids, formed by the breaking down of proteins. For the way in which the amino-acids are joined, see peptide linkage.

'polyphase – ↓ phase.

'polypus ('pɔlipəs) – ("many-foot"): a tumour (diseased growth), e.g. in the nose, so called because it has many stems going down into the tissue on which it is.

'poly'saccharides ('pɔli'sækəraidz) – compounds such as starch, cellulose, whose molecules are built up from many simple sugar units (e.g. glucose).

'poly'styrene ('pɔli'stairiin) – plastic made from styrene (made from ethylene and benzene); transparent; waterproof; can be shaped by heat after solidifying; hard and easily broken. It is much used for insulation and for ↓ condensers; also for buttons and small ornaments.

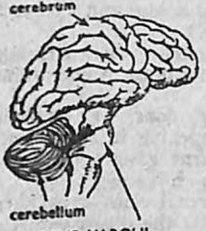
'poly'tetra'fluoro'ethylene – In tetrafluoroethylene ($CF_2:CF_2$) four fluorine atoms take the place of the hydrogen atoms of ethylene ($CH_2:CH_2$). Polytetrafluoroethylene is the polymer . . . $CF_2.CF_2.CF_2$ . . . It is very resistant to chemicals and heat. Trade name Teflon. ↓ fluorohydrocarbons.

'polythene ('pɔliθiin) – plastic made from ↓ ethylene; moisture resisting, used especially in electrical instruments, and for waterproof packing: for diagram. ↓ polymer.

'poly'vinyl plastics ('pɔli'vainil -) – The vinyl group is $CH_2:CH-$: polyvinyl plastics are made by polymerizing vinyl chloride ($CH_2:CH.Cl$), or vinyl acetate ($CH_3.COOCH:CH_2$), or vinyl acetal (= vinyl acetate and an ↓ aldehyde). Polyvinyl plastics are soft, rubber-like, or hard; are resistant to water and most acids, and are used, e.g. for electrical insulation.

pome (poum) – fruit similar to an apple. **po'mology** – the scientific study of fruit-trees.

pons – bridge. **'Pons Va'rolii** ('pɔnz-væ'rouliai) – bridge of nerve-fibres passing round the stem of the brain and joining up various parts of the brain.



PONS VAROLII

'poplin ('pɔplin) – plain woven cotton or silk with many more cross-threads than long threads, so causing raised cross lines, as used for men's ties and shirts.

'popli'teal ('pɔpli'tii.əl) – just at the back of the knee, e.g. popliteal space.

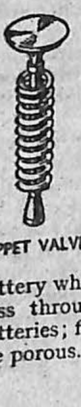
'poppets – beams and posts carrying the weight of a new ship on the rails down which it slides when first put into the water.

'poppet valve – valve as shown, as in motor-cycle engines, etc.

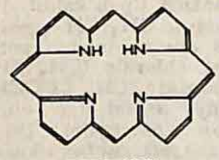
pore (pɔɔ) – opening-place of a sweat-gland in the skin; similar opening in the surface of a leaf (opening of a stoma).

Po'rifera (pɔ'rifərə) – sponges.

'porous ('pɔɔrəs) – having pores (very small holes), e.g. **porous pot** – pot made of soft pottery which allows air or liquid to pass through, as in some electric batteries; filters (for purifying water) are porous.



POPPET VALVE



PORPHYRIN

'porphyrins ('pɔɔfirinz) – compounds with a cage-like structure of carbon, hydrogen, nitrogen (as shown) enclosing an atom of a metal, e.g. iron, as in haem (the active part of haemoglobin = red blood substance). In chlorophyll (the green substance of plants) the cage encloses an atom of magnesium. (In the diagram add C at all inside angles and CH at all outside angles.)

'porphyry ('pɔɔfiri) – rock with large crystals set in a mass of fine-grained material.

port – opening, door, e.g. **ex'haust port** – the opening in the cylinder by which burnt gases go out (e.g. from a ↓ two-stroke engine).

portal vein ('pɔɔtəl-vein) – vein carrying blood from the digestive organs to the liver; it is different from most other veins because it divides up into capillaries (small blood vessels) instead of carrying the blood straight to the heart.

'Portland ce'ment ('pɔɔtlənd si'ment) – ordinary cement as used for houses, bridges, etc. (made from burnt clay and chalk).

'positive ('pɔzitiv) – There are two kinds of electric charges, called positive ⊕ and negative ⊖. Like charges (charges of the same kind) repel (drive apart); unlike charges attract (draw together). An atom consists of a positively charged nucleus with negatively charged electrons moving round it. An atom with too few electrons has a ⊕ charge; it is a **positive ion.**

In an electric circuit we often speak of the current as if it is a flow of positive electricity from the ⊕ pole of the battery to the ⊖ pole. This actually happens in a gas or solution which contains ⊕ ions, but in a wire, radio valve, and X-ray tube the current is a flow of ⊖ electrons from the ⊖ pole (of, e.g., the battery) to the ⊕ pole.

'positron ('pɔzitrɔn) – particle of electricity, similar to an electron but with a positive ⊕ charge; it is about 1/1850 of the mass of a hydrogen atom. Positrons exist only for about a millionth of a second. First found in the study of ↓ cosmic rays.

post (poust) (paper) – sheet of paper 15¼ inches × 19 inches.

post-/ (poust-) – after, behind, e.g. **post'partum 'haemorrhage** (- hemərid3) – bleeding of the mother after the birth of a child. **post'mortem** – examination of a body after death to discover the cause of death.

'potash (pɔtæʃ) = ↓ potassium carbonate: ↓ potassium hydroxide.

po'tassium (pɔ'tæsiəm) – metal element; important to plant life, compounds are found in plant ashes. **potassium 40** – naturally occurring radioactive form of potassium (of ↓ atomic weight 40 instead of 39). **potassium bicarbonate** – $KHCO_3$, used in case of acidity of the stomach, also in cough mixtures. **potassium bromide** – KBr, used to quieten excitability; also in photography. **potassium carbonate** – K_2CO_3, used in making soft soap and hard glass. **potassium chloride** – KCl, found in large amounts in nature (e.g. ↓ carnallite); also in the water of the Dead Sea; used as a fertilizer and for making ↓ caustic potash and other potassium salts. **potassium chlorate** – $KClO_3$, explosive; used also for sore throats. **potassium cyanide** – KCN, very poisonous, used in dissolving gold. **potassium ferrocyanide** – $K_4Fe(CN)_6$, used in testing for the presence of iron and copper, and for making ↓ Prussian blue. **potassium hydrogen tartrate** – cream of tartar, $C_4H_5O_6K$, used in cakes. **potassium hydroxide** – KOH, = caustic potash. **potassium nitrate** – KNO_3 = nitre = saltpetre, used in making gunpowder (etc.). **acid potassium oxalate** = "salts of lemon". used to take out ink stains. **potassium permanganate** – ↓ permanganate; **potassium dichromate** – ↓ dichromate.

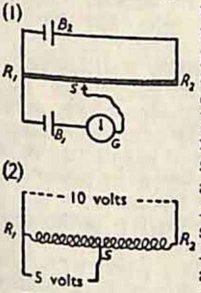
po'tential 'difference (P.D.) (po'tenʃəl -) – difference of electric pressure.

If there is a P.D. between two points, A and B, and they are joined by a conductor (e.g. a copper wire), a current flows from A to B (or B to A). Potential difference is usually measured in ↓volts. **The potential of a Body, the potential at a point** – the P.D. between that Body (point) and the Earth.

po'tential energy – possibly usable energy due to position, e.g. the usable energy of water stored at the top of a hill; or due to a distorted shape (thing forced into unusual shape), e.g. a clock-spring which has been wound up.

po'tential 'gradient (- 'greidiənt) – how "steeply" the electric pressure changes, i.e. potential difference between two points divided by their distance apart.

po'tenti'ometer (po'tenʃi'ɔmitə) – (1) instrument for measuring a potential (pressure) difference of electricity. Drawing 1 shows its use for measuring the voltage of a battery B_1. B_2 is a fixed stronger battery. R_1R_2 is a resistance wire; the contact (join) S can slide along it. S is moved to a point so that the ↓galvanometer G reads 0 (zero). The distance R_1S is measured. The operation is repeated with a battery B_3 of *known* voltage in place of B_1 and the new distance R_1S measured. Then



POTENTIOMETER

$$\frac{\text{voltage of } B_1}{\text{voltage of } B_3} = \frac{R_1S \text{ for } B_1}{R_1S \text{ for } B_3}$$

and so the voltage of B_1 can be worked out.

po'tenti'ometer – (2) See diagram 2. S is a sliding piece which can touch any point in R_1–R_2. Current can be taken off between R and S. If, e.g., half the resistance is used, half the pressure is taken. The instrument is used e.g. in controlling the loudness in a radio set.

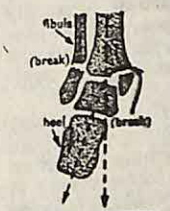
po'tometer (po'tɔmitə) – instrument for measuring the amount of water taken in by a plant.

pot still – container of boiling liquid whose vapour is led off to a condenser (cooled tubes which cause the vapour to become liquid) – as used for making alcoholic spirits.

POTT'S CURVATURE

Pott's curvature, Pott's disease – bending of the spine at an angle owing to eating away by tubercle bacilli of the inner side of some of the vertebrae (separate bones of the spine).

Pott's fracture – breaking of the lower ends of the leg bones as shown and dislocation (tearing out of place) of the ankle.



POTT'S FRACTURE

poundal (paundl) – unit of force which causes a mass of 1 pound to gain speed at the rate of 1 foot per second in each second; about equal in strength to the downward force of a ½-ounce weight.

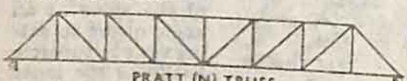
'pound-'calorie – ↓calorie.

'power (pauə) – rate of doing work, e.g. as so many ↓foot-pounds of work per sec.; ↓horsepower. **"to the power of"** – e.g. x to the power of $3 = x^3 = x \times x \times x$.

power factor – First see phase. The power in a direct-current circuit = current (amps) × pressure (volts). In an alternating-current circuit the current and voltage may not be in step. Then the power is equal to current × pressure × a certain number depending on the difference of phase. This number, which is less than 1, is the power factor. Example: D.C. 220 volts, 5 amps (current); power 220 × 5 = 1,100 watts. A.C. 220 volts, 5 amps, but the voltage leads the current (amperes) by angle of 60°: in this case the power factor is *$\frac{1}{2}$: $220 \times 5 \times \frac{1}{2} = 550$ watts. If voltage and current were exactly in phase the P.F. would be 1; and power would be 1,100 watts: *(the power factor is the ↓cosine of the phase difference; cosine 60° = $\frac{1}{2}$).

power of a lens – 1 divided by ↓focal length in metres; e.g. focal length = 2 metres; power = 1 ÷ 2 = 0·5 ↓dioptres.

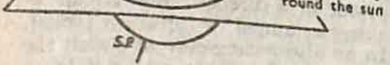
Pratt truss – framework of beams as shown used (e.g.) for bridges; also called N truss.



PRATT (N) TRUSS

pre-/, prae-/ (prii-) – in front of, before, e.g. **pre'cordial** – in front of the heart. **'precast cement** – cement cast into blocks before use in building. **'preig'nition** – setting fire to the petrol-vapour in an engine before the electric spark, e.g. by a red-hot piece of carbon, or over-heating.

'pre'cession (pri'seʃn) – If a Body (e.g. a spinning top, a planet, an atomic particle) is spinning about an axis, and there are forces trying to turn it over on to its side, the Body does not turn over but its axis moves round in a circle as shown in the smaller drawing below. **pre'cession**



PRECESSION OF EQUINOXES

of the 'equinoxes – gradual change in the direction of the Earth's axis, like that of a spinning top which is losing speed. The axis makes an angle of 23½° as shown and points to *A*. Later it will point to *B*, *C* . . . and come back to *A*, having gone round the circle, after about 26,000 years. At present the axis points very nearly to the Pole Star (Polaris); later it will point to other stars.

pre'cipitate (pri'sipiteit) – (1) to form an insoluble solid (in a liquid) which goes down to the bottom; the substance so made insoluble; (2) rain, snow, hail, etc., are precipitated when they fall on the Earth's surface.

pre'dictor (pri'diktə) – instrument used by anti-aircraft guns to calculate very rapidly (from speed and height) the point at which to aim the gun and the time at which the shell should be made to explode so as to meet an aeroplane in its flight.

'prednisone, prednisolone – artificially made substances, similar to ↓cortisone, but more effective in treating inflammation of joints.

preening (by a bird) – cleaning and arranging the feathers and oiling them with oil from the **preen-glands.**

pre'forming (plastics) (prii'fɔɔmiŋ) – pressing the plastic powder into small equal-sized pieces so as to make it easier to fill the moulds; making plastic into bars of about the right shape which will be cut or pressed to exact shape by a machine.

pre'frontal leu'cotomy (- lju'kɔtəmi) – The prefrontal lobes (parts) of the brain are those two parts which lie just behind the upper part of the forehead; they are concerned with the general control of behaviour. Prefrontal leucotomy is the cutting of the nerve fibres of the front (general control) area of the brain so as to lessen or cure mental disorder.

'pregnant (woman) ('pregnənt) – fertilized, child-bearing.

pre'hensile (pri'hensail) – able to seize and hold things, e.g. a monkey's foot, but not a man's.

pre'potency (prii'poutənsi) – tendency (in breeding from two different kinds of animal) for one parent to have greater effect than the other on the offspring.

'prepuce (priipjuus) – the loose skin over the end of the male sex-organ.

'presby'opia ('prezbi'oupiə) – eye-sight as in old people, especially loss of the power to see near things. The change is due to loss of elasticity in the lens, which is unable to become rounder (stronger) so as to form the image of near things on the retina (nerve endings).

'presen'tation ('priizen'teiʃən) – the appearance during the process of childbirth of a part of the child in the opening from which the child is born. Ordinarily this is the head, but in a **malpresentation** it may be the breech (bottom of the body) or an arm.

'pressor ('presə) – drug (or nerve) which increases activity, e.g. causes increase in blood pressure.

'pressure ('preʃə) – a force spread over an area, e.g. there is a pressure of steam on the inside of the boiler of an engine. Pressure is measured thus: Total force ÷ the area on which it is pressing, e.g. Total force 10,000 lb.; area on which it is pressing 50 square feet; pressure = $\frac{10000}{50}$ = 200 lb. per square foot; so also per square inch, per square centimetre.

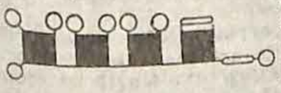
'pressure gauge – instrument for measuring pressure (e.g. of steam); one kind consists of a curved tube which tends to straighten as pressure increases. For picture see Bourdon.

'pressure 'governor (-'gʌvənə) – instrument which keeps gas-pressure at a fixed level; of various kinds, e.g. a light, gas-proof membrane which, when pressure becomes too great, curves up and pulls a valve shut.

prickly heat – = ↓'mili'aria, inflammation of the sweat glands as in a hot damp climate.

'primary ('praiməri) – first, original, as a starting-point, from which all other things are made. **primary bow** – rainbow, arch of colours in the sky, formed by sunlight which is reflected only once inside a raindrop.

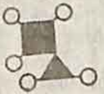
'primary 'acid – organic acid with the acid group (–COOH) joined to the end of a carbon chain (not to a C atom in the middle of the chain), e.g. $CH_3.CH_2.CH_2.COOH$. So also **primary alcohols** – alcohols in which the –OH group is joined to the end of a chain. ↓ carbinol, secondary.



$CH_3CH_2CH_2COOH$

PRIMARY ACID

'primary 'amines – The ammonia molecule is NH_3. If *one* H atom is replaced by a hydrocarbon group (e.g. methyl, CH_3–) the compound is a primary amine (e.g. $CH_3.NH_2$, methylamine).



$CH_3.NH_2$

PRIMARY AMINE

'primary cell – an ordinary electric cell for producing electricity by chemical action. (A storage battery consists of ↓ secondary cells.)

'primary 'coil – In some electric machines (↓ induction coil, transformer) the current which is passed through a primary coil of wire, often wound on an iron bar, sets up (induces) a current in a separate secondary coil which is wound over it. Also called primary winding.

'primary 'colours – colours from which all other colours can be made; in the case of paints (for reflecting light) red, yellow, blue; in the case of coloured light, as in colour photography and coloured cinema films, red, green and blue-violet.

'primary 'thickening – the first woody material made in the stem of a plant; in plants which grow to a great size (e.g. trees), further (secondary) thickening is made by the ↓ cambium.

'primary 'winding – ↓ primary coil.

'Primates ('praimeits) – highest order of mammals (breast-feeding animals) including lemurs, monkeys, apes, Man.

'prime 'cost – actual cost paid (for materials) after all discounts (lessened price for large quantity and quick payment) have been taken off.

Prime Me'ridian (me'ridiən) – the map line passing through Greenwich (Greenwich longitude 0°) from which East and West on a map are marked and measured.

prime mover – engine which produces power from coal, oil, water power, wind power, etc. (e.g. *not* an electric generator which must be driven by another engine).

prime number – number which can only be divided exactly by itself or 1, e.g. 53 (= 53 × 1) but not 51 (= 51 × 1 and 17 × 3).

'primer ('praimə) – explosive charge used to set off a larger mass of explosive; paint put on first as a base for other paint.

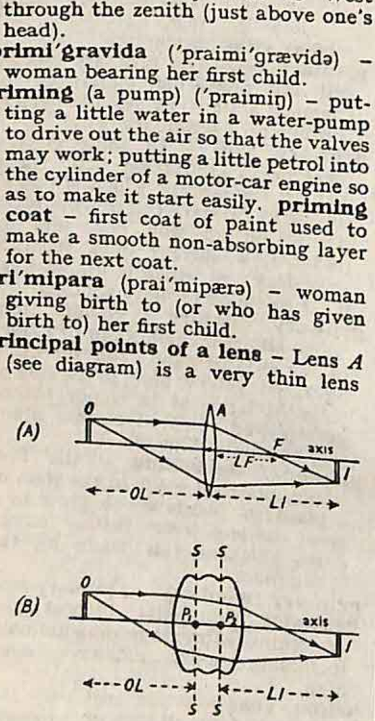
'Prime 'Vertical – circle imagined as drawn in the sky East to West through the zenith (just above one's head).

'primi'gravida ('praimi'grævidə) – woman bearing her first child.

priming (a pump) ('praimiŋ) – putting a little water in a water-pump to drive out the air so that the valves may work; putting a little petrol into the cylinder of a motor-car engine so as to make it start easily. **priming coat** – first coat of paint used to make a smooth non-absorbing layer for the next coat.

pri'mipara (prai'mipærə) – woman giving birth to (or who has given birth to) her first child.

principal points of a lens – Lens *A* (see diagram) is a very thin lens



PRINCIPAL POINTS

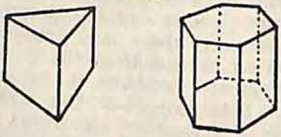
Light from an object *O* is bent by the lens so that it makes a clear image at *I*. The distances object to lens (*OL*), lens to image (*LI*), and lens to principal ↓ focus *F* (*LF*) are such that

$$\frac{1}{LI} + \frac{1}{OL} = \frac{1}{LF}.$$

Diagram *B* shows a thick lens (or a set of lenses joined together as one). The same relation will be true if the measures are made not from the outside of the lenses but from certain fixed points, P_1 and P_2. These (P_1, P_2) are the principal points. The surfaces (planes) SP_1S and SP_2S are the **principal planes.**

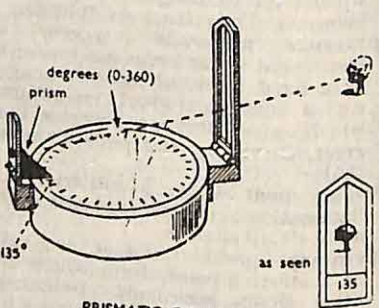
printed circuit – electric circuit (e.g. for radio) in which the parts consist of thin flat strips of metal. The circuit is printed on a specially treated copper sheet and then the unwanted parts etched (eaten) away.

prism (prizm) – solid with a flat base and parallel upright edges. A glass prism with three upright edges (commonly used for making a spectrum) is often called merely "a prism".



PRISM

pris'matic 'compass – compass with a prism which makes it possible to see the thing (e.g. tree) whose compass-bearing is needed and the numbers (1°–360°) of the compass at the same time.



PRISMATIC COMPASS

probable error – When many measurements are made of the same quantity (e.g. the length of something), the figures are not all the same because of chance errors. We need to state the average measurement and give an idea of the spread on each side of this average. We can state the average as (e.g.) 15·0 ± 0·1 inches. This means that the chance that the true measurement lies between 14·9 and 15·1 is equal to the chance that it is anything outside these values. 0·1 is the probable error. Average 15·0 ± 0 would mean that all the measures were exactly 15. Probable error = 0·67 × ↓standard deviation.)

probe (proub) (1) small bar with a rounded end which a surgeon puts into a wound (or other opening) to feel, e.g., where a bullet is, or how deep the hole is, or to push a dressing in; (2) electrode used for examining the electrical conditions at a point (e.g. in the brain); (3) rocket for examining the conditions around a heavenly Body, e.g. a lunar (moon) probe.

pro′boscis (prə′bɔsis) – the long trunk (nose) of an elephant; any similar part, e.g. the sucking-tube of a fly.

′procaine (prou′kein) – = novocaine, synthetic (artificial) substance similar in action (but not chemically similar) to cocaine; used to prevent pain, e.g. in pulling out a tooth: (trade name).

′process-block (′prouses-) – metal plate from which a picture is printed.

proct-/-o-/ (prɔkt-) – the rectum (lowest part of the bowel) or anus (opening of the bowel), e.g. **proc′titis** – inflammation of the rectum.

pro′dromal symptoms (pro′droumәl -) ("before-running"): signs showing the oncoming of an illness.

pro′ducer-gas (prə′djuusə -) – gas (used for heat or power) made by passing air and a small amount of steam through hot coal or coke. (The gas contains about 25% CO, 5% CO_2, 12% H_2, and nitrogen.)

pro′geria (pro′dʒeriə) – the appearance of old age in a young person, due to disease of the ↓pituitary gland.

pro′gesterone (pro′dʒestәroun) – substance, obtained from the ↓corpus luteum, which prepares the *uterus for child-bearing; used as a medicine to prevent abortion (birth of a child before full-time): *(female organ in which the child is formed).

prog′nosis (prɔg′nousis) – the probable outcome of an illness, e.g. "The prognosis is good" = he is likely to recover.

programme (of a computer) – the set of instructions, written in "machine language", which enables the computer to carry out a set of calculations.

pro′gression (pro′greʃәn) – a series of numbers each different from the next in a regular way. **arith′metical progression** – e.g. 2, 4, 6 . . . (each + 2) . . . or 2, 5, 8 . . . **geo′metrical progression** – 2, 6, 18 . . . (each × 3) . . . or 1, 4, 16 . . . **progression ratio** – rate of increase of gears on a lathe; they increase in geometrical progression.

pro′jection (pro′dʒekʃәn) – way of showing a round (or other solid shape) on a flat surface, e.g. a shadow is a projection; maps are projections. **cy′lindrical projection** – a map made as if the land shapes were thrown as shadows on a cylinder surrounding the Earth. (A Mercator map is a form of cylindrical projection). So also conical projection (on to a cone). ↓gnomonic, polar.

pro′jector (pro′dʒektә) – (cinema) instrument which throws the pictures on the screen.

′prolapse (′proulæps) – slipping down of the bowel (or ↓uterus) out of place.

pro′liferate (pro′lifәreit) – (of cells, e.g. of cancer) grow, become more in number; (of a plant) produce offshoots which grow up into new plants.

pro′nator muscle (prou′neitә) – muscle which turns the arm so that the inside of the hand is downwards.

′Prontosil (′prɔntosil) – the first ↓sulphonamide drug; a red dye containing a sulphonamide group (SO_2NH_2); it has no effect on bacteria outside the body, but in the body the molecule is split and part of it becomes active against bacteria: (trade name).

proof – (printer's): a rough printing from type, sent to the writer so that he may set right mistakes.

proof-stress – = ↓yield point.

prop-/ (proup-) – containing the ↓propane arrangement of three carbon atoms, e.g. **propionic acid** (CH_3CH_2COOH).

'propane ('proupein) – $CH_3.CH_2CH_3$, a colourless gas which burns: ↓paraffin hydrocarbon.

pro'pellant (prə'pelənt) – slow explosive used to drive the bullet (etc.); (not rapid explosive as in a shell or bomb).

pro'peller (prə'pelə) – screw of ship, air-screw of aeroplane.

proper motion (of star) – the real change of position of a star if it is thought of as moving on the inside of a hollow ball surrounding the Earth (not its seeming motion because the Earth is moving).

prophy'lactic (treatment) (prɔfi'læktik) – treatment (not to cure) but to prevent a person from getting the disease; e.g. taking quinine (or similar drug) when you have not got malaria but so that you may not get it.

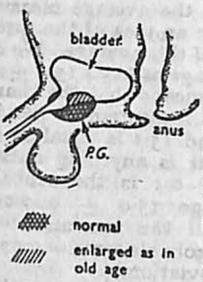
'propi'onic acid ('proupi'ɔnik) – C_2H_5COOH, the third in the series of ↓fatty acids – the first one which is oily.

pro'portional limit (prə'pɔɔʃənəl) – point in testing the strength of a material when the change of length ceases to be proportional to the strength of the pull: beyond this point the test-piece will not return to its original shape.

proprio-/ – one's self, e.g. **'proprio'ceptor** ('prouprio'septə) – nerve-ending which gives sensations telling about oneself, e.g. about the position of the limbs, the state of muscles.

'propyl ('proupil) – the group of atoms $\cdot CH_3.CH_2.CH_2-$ (propane less one H atom), e.g. propyl alcohol $CH_3.CH_2.CH_2.OH$.

'prostate gland ('prɔsteit -) – gland just at the base of the bladder (bag storing urine) in the male; it produces the liquid in which the semen (male reproductive cells) is carried; it is sometimes enlarged in elderly men and interferes with the flow of urine.



PROSTATE GLAND

'prosthesis ('prɔsθisis) – supplying an artificial eye (leg, etc.) in place of a lost one; adj. **prosthetic** (prɔs'θetik), e.g. prosthetic surgery.

pros'thetic groups (prɔs'θetik -) – An enzyme is a protein which causes chemical changes in the body without itself being changed: most of the chemistry of the body is done by enzymes. Prosthetic groups are substances joined to an enzyme without which the enzyme cannot work. These groups contain one or other of the water-soluble ↓vitamins. The enzymes in the body are very small in amount, and a far smaller amount of these groups is needed by the enzymes; hence the great effects (in the form of illness) which result from lack of very small amounts of vitamin.

'protamines ('protæmiinz) – simplest form of proteins, found only in fish.

pro'tandrous (prou'tændrəs) – having the male cells (e.g. pollen in a flower) ripen before the female cells.

Pro'targol (prou'taagɔl) – preparation of silver (silver proteinate) used as an antiseptic for the eye, urinary passage, etc.: (trade name).

'protease ('prouti.eis) – an ↓enzyme which breaks up proteins, e.g. pepsin (in the stomach juices).

'protein ('proutiin) – the main chemical substance of living matter, a part of every living cell: proteins are very complicated substances built up of long chains of ↓amino-acids as a framework: ↓peptide. These chains may consist of a few hundreds or of many thousands of such units; most consist of several chains held together by "bridges". At certain points in the chain one of about 30 different other units (amino-acid residues) may be added. Proteins contain carbon (about 50%) oxygen (about 25%), nitrogen (about

15%), hydrogen, phosphorus, sulphur.

'protein 'hydro'lysate (- 'haidro'laiseit) – ready-digested proteins (broken into amino-acids, see above); used for feeding people weakened by lack of food.

protein plastics – plastics made up of chains of ↓amino-acids,joined across with formaldehyde, e.g. casein plastics (made from milk); also Nylon.

'protero-/ ('proutəro-) – in front of, before, e.g. **'Protero'zoic era** – "before life" – the era (age) before the Palaeozoic ("ancient life") era; it is doubtful if remains of any living things (except perhaps marine ↓ algae) have ever been found in the rocks.

pro'thallus, pro'thallium (prou'θæləs, -'θæliəm) – small plant which grows from a fern spore. It bears male and female cells. After the joining of a male and female cell an ordinary fern-plant grows. ↓alternation of generations.

Pro'tista (prou'tistə) – ("first of all"): large class of very simple organisms midway between plant and animal.

'proton ('proutɔn) – particle with a positive charge which forms the nucleus of a hydrogen atom.

'proto'pathic sensations ('prouto'pæθik -) – general feelings, e.g. of heat or pain. These sensations are not localized (do not seem to come from some exact place) and are produced only by great heat, a heavy blow, etc. ↓epicritic.

proto-planet – the original cloud of gas and dust (from the sun) out of which, according to present theories, the planets were formed.

'proto'plasm ('prouto'plæzm) – the jelly-like substance of which all living things are formed.

'Proto'zoa ('prouto'zouə) – the simplest organisms in the animal kingdom, they consist of one cell: e.g. ↓amoeba, paramoecium, malaria parasite.

pro'tractor (pro'træktə) – instrument for drawing and measuring angles.

proud flesh – unhealthy growth of tissue in an infected wound; it has to be burned away, e.g. with silver nitrate.

'proximal (end) ('prɔksiməl-) – inner (end), nearer to the middle of the body; **distal** = further, outer end; e.g. the proximal end of the last joint of the finger is the end nearer the hand; the nail is at the distal end.

pruina (pru'iinə) – powdery covering of the surface of a ripe fruit, e.g. plum.

pru'rigo, pru'ritus (pruə'raigou, pruə'raitəs) – feeling which makes one want to scratch, itching: e.g. **pruritus ani** (- 'einai) – itching of the anus (opening of the bowel).

'Prussian 'blue – blue dye containing iron and ↓cyanide (CN) groups.

'prussic 'acid ('prʌsik -) – hydrocyanic acid, HCN, a powerful poison; it affects the cells of the body so that they cannot take up oxygen from the blood and stops the heart.

psal'terium (sɔl'teriəm) – third stomach of a cow: for picture see abomasum.

psamm-/-o-/ – sand, e.g. **'psammophil** ('sæmofil) – plant which lives in sandy places. **psam'moma** – a tumour (diseased growth) in the brain containing sand-like substance.

pseudo-/ ('sjuudo-) – imitating, like: e.g. **'pseudo'podium** (- 'poudiəm) – part of creature which looks like (but is not) a foot; e.g. the ↓amoeba (single-celled creature) pushes out a pseudopodium (part of its protoplasm) to encircle a piece of food: (chemistry) substance very like, closely related to – e.g. **p'seudo-alums** – substances (certain double sulphates) very like alum. **'pseudomorph** (fossil) – a fossil which has the exact outside shape of the original, but is not the same as the original inside.

pso'riasis (sɔ'raiəsis) – skin disease which causes rough, red areas covered with white, silver-like plates of dry skin.

psych-/-o-/ ('saik-o-) – of the mind. **psy'chiatry** (sai'kaiətri) – medical treatment of disorders of the mind. **'psycho-a'nalysis** – method of finding hidden, unconscious conflicts (battles of desires) and bringing them back into the consciousness, e.g. by studying the sufferer's dreams.

psy'chology (sai'kɔlədʒi) – the science which deals with the nature of behaviour and the working of the mind (both normal and abnormal).

'psychoneu'rosis (-nju'rousis) – a disorder of emotional life, e.g. ↓ hysteria.

'psychopath ('saikopæθ) – a person who is not insane (mad) but whose emotions and social conduct are disordered or abnormal.

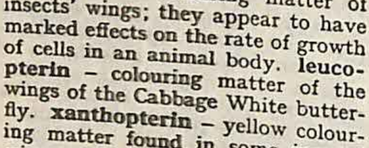
psy'chosis (sai'kousis) – a serious disorder of the mind, causing great changes in the character, e.g. ↓ dementia precox, ↓ paranoia, etc.

'psycho'therapy (-'θerəpi) -- medical treatment of disorders of the mind, e.g. by psycho-analysis.

'Pterido'phyta – large group of plants with feather-like leaves; it includes ferns, club-mosses, "horse tails".

/-pterins, pteridines ('terinz) – complex chemical compounds (with a characteristic type of molecule) first found in the colouring matter of insects' wings; they appear to have marked effects on the rate of growth of cells in an animal body. **leucopterin** – colouring matter of the wings of the Cabbage White butterfly. **xanthopterin** – yellow colouring matter found in some insects' wings and in the bodies of wasps; it causes great increase in cell-division in the kidney of rats. **methopterin** – a related compound, also similar to ↓ folic acid; it appears to slow down the quick growth of ↓ cancer cells. **chrysopterin** and **erythropterin** are found in active human ↓ tuberculosis.

ptero-/ – ("wing"): e.g. **'ptero-'dactyl** ("wing-finger"), a flying lizard: bones which in Man form the fingers, in the pterodactyl form the framework of the wings. It lived in the ↓ Mesozoic age.



PTERODACTYL

P'tolemaic system ('tɔli'mei.ik) – system of astronomy – based on the idea that the Earth is at the centre and the sun, planets, stars, move round it.

p'tomaines ('toumeinz) – poisonous substances (amino-acids) formed by bacteria in decayed meat.

p'tosis ('tousis) – falling or hanging down, e.g. the falling down of the upper eyelid due to loss of power in the muscle; falling or hanging down of any organ, e.g. **'hepatop'tosis** – state in which the liver is out of place downwards.

p'tyalin ('taiəlin) – an ↓ enzyme in the saliva (liquid of the mouth) which changes starch into sugar.

Pu – chemical sign for ↓ plutonium.

'puberty ('pjuubəti) – the change from childhood to fully developed man- (woman)-hood, at about 14 years of age. **pu'bescence** – the process of reaching puberty.

'pubis ('pjuubis) – the bone (part of the pelvis = ring of bone at the base of the body) just above the reproductive organ; adj. **'pubic.**

'puddling ('pʌdliŋ) – (1) covering the inside of a water-course, pond, pool, etc., with clay; (2) causing movement in melted iron so that the oxygen of the air may combine with the carbon, silicon, etc., in it and produce wrought iron.

pu'dendum (pju'dendəm) – the outside part of the female sex organ.

pu'erperal (pju.'əəpərəl) – having to do with childbirth, e.g. **puerperal fever** – fever resulting from infection of the mother during the process of childbirth, because of lack of care or of cleanness in the place or instruments or helpers.

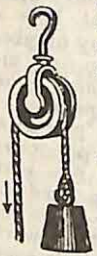
'puer'perium ('pjuə'periəm) – the time (about 5 weeks) from the beginning of the first muscular contractions leading to childbirth to the time when the mother is as before the child-bearing began and able to lead her full ordinary life.

pug (pʌg) – clay of which bricks are made. **pug mill** – machine with revolving knives which cut up and mix clay for brick-making. **pugging** – substance put under a floor to stop sound from passing through it.

′Pulex ′irritans (′pjuuleks -) – the ordinary flea which jumps and bites the skin.

pull (pul) – one printing from type so as to see if it is correct, or so as to correct it.

′pulley (′puli) – wheel over which a rope is pulled. **pulley-block** – such a wheel inside a block of wood, or in a metal frame.



PULLEY

′pullu′lation (′pʌlju′leiʃən) – forming buds.

pulmonary (′pʌlmənəri) – of the lungs.

pulp (pʌlp) – soft, almost liquid mass, e.g. the soft part of fruit; paper (etc.) broken up and softened in water. **wood-pulp** – wood broken up and softened with chemicals. **pulp** (of tooth) – soft inside tissue of a tooth containing the blood-vessels and nerve, also the cells which form the dentine (hard outer part).

pumice (′pʌmis) – sponge-like stone formed by volcanoes, used e.g. for cleaning dirty hands.

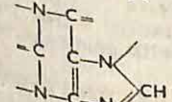
pumped storage – way of storing electric power. Spare electric power is used to pump water into a high container (e.g. mountain lake); when required, the water can run down through a ↓turbine and generate electricity again.

punch – steel tool used for cutting holes in leather or metal.

′pupa (′pjuupə) – stage in the life of an insect, e.g. moth, after the larva-stage, before the flying stage, when it is enclosed in a hard outer shell (chrysalis).

′purchase (ship) (′pəətʃəs) – to purchase = to move a heavy thing by means of a pulley, etc. **purchase block** – pulley so being used. **purchase fall** – rope pulled in so doing.

′purgative (′pəəgətiv) – (medicine) used to cause action of the bowels, e.g. "Fruit salts", castor oil, etc.

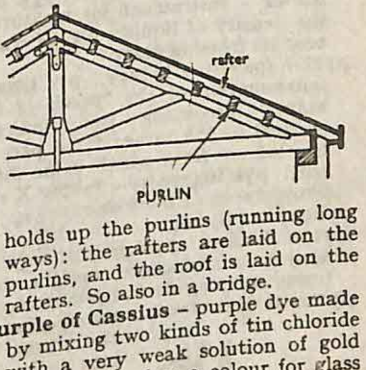


PURINE GROUP

′purines (′pjuuriinz) – group of compounds (animal and vegetable): closely related to **uric acid.** Nucleo-proteins (found in **cell tissue,** e.g. in the pancreas, liver, kidney, brain) break down in digestion into purine bases, and then into uric acid. The drugs caffeine (from coffee) and theobromine (from cocoa) are vegetable purines. ↓**pyrimidines.**

Pur′kinjee effect (pə′kindʒi -) – (1) The eye in weak light is more sensitive to blue, less sensitive to yellow, than in good light; so (in a weak light) a yellow road through grass looks rather like a black road through snow. (2) (in photography). The amount of contrast is the relation of black and white on a photographic negative. This varies with the colour of the light used (e.g. red if photographing through a red screen). So in colour photography three colour films taken (exposed) and developed together have different degrees of contrast. This causes difficulty in colour photography using 3 films joined. ↓subtractive.

′purlin (′pəəlin) – See diagram: the truss (triangular frame) in a roof holds up the purlins (running long ways): the rafters are laid on the purlins, and the roof is laid on the rafters. So also in a bridge.



PURLIN

purple of Cassius – purple dye made by mixing two kinds of tin chloride with a very weak solution of gold chloride. Used as a colour for glass (etc.).

′purpura (′pəəpjurə) – purple areas on the surface of the body caused by the breaking of small blood-vessels under the skin. This may be a result of some other disease, or purpura may be an illness in itself resulting from bad food and bad living conditions.

'purulent ('pjuurjulənt) – forming ↓pus.

pus (pʌs) – yellow liquid (composed of dead blood cells and bacteria) in, or coming out from, an infected wound.

push-pull – arrangement of two small radio valves to share the work of giving power to a loud-speaker. They are arranged so that when the ↓grid of one is positive, the grid of the other is negative. This arrangement produces a sound which is more true to the original sound being sent.

'pustule (pʌstjuul) – small swelling on the skin containing ↓pus.

pu'tamen (pju'teimen) – the membrane inside the shell of an egg; the hard inner part round the seed in a fleshy fruit, e.g. shell of a plum-stone.

py-/-o-/ (pai-o) – pus (= infective matter in a wound or in the blood); e.g. **py'aemia** – infection of the blood causing abscesses (infected areas in various parts of the body).

pyc'nidium (pik'nidiəm) – round spore-container of certain fungi.

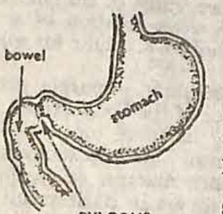
pycno-/ (pikno-) – dense, e.g. **pyc'nosis of a cell** – becoming smaller and denser. **pyc'nometer, pyk'nometer** – instrument for measuring the density of liquids, e.g. of water near its freezing point.

pyel-/ (paiel-) – kidney. **pye'litis** – inflammation of the *pelvis of the kidney producing pus (infected matter) in the urine: *(the part of the kidney from which urine flows out). **pye'lography** – taking X-ray photographs of the kidney.

pykn-/ – ↓pycn-/.

'pylon ('pailɔn) – upright post or pillar used as a land-mark; upright steel frame carrying electric-power wires.

py'lorus (pai'lɔɔrəs) – the opening of the stomach into the bowel.



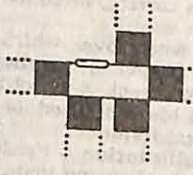
PYLORUS

pyo-/ – ↓py-/. **'pyo-genic** – causing the production of ↓pus.

'pyo'rrhoea ('paiə'riiə) – a flow of ↓pus.

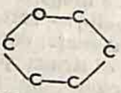
pyorrhoea 'alveo'laris – inflammation of the gums (flesh) and sockets (holes) in which the teeth are set.

pyr-/ – burn, heat: e.g. ↓**pyrexia**, ↓pyro-/.



PYRANOSE

'pyramid ('pirəmid) – solid with a flat base and any number of sloping sides which come to a point.



PYRANOSE RING

'pyranose ring ('pirənous) – ring of five carbon atoms and one oxygen atom forming the framework of many simple sugars, e.g. glucose.

'pyrenoids ('pirinɔidz) shiny particles (found in cells of certain lower plants) which help in the making of starch.

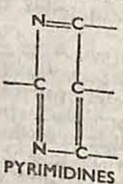
py'retic (pai'retik) – having to do with fever, e.g. aspirin is an **anti-pyretic** drug. ↓pyrexia.

'Pyrex glass ('paireks) trade name of glass with a large proportion of silica in it, able to resist heat.

py'rexia (pai'reksiə) – rise of body temperature; fever.

'pyridine ('piridiin) – colourless liquid with an unpleasant smell, obtained from coal tar; used as a solvent and to denature (make undrinkable) alcohol; the molecule is a ring consisting of five CH groups and one N atom.

py'rimidines (pi'rimidiinz) – substances containing the pyrimidine ring, as shown, e.g. nucleic acids (↓purines) and ↓barbituric acid (from which sleep-producing drugs are made). (Compare with the purine ring.)



PYRIMIDINES

'pyrite ('pairait), **iron pyrites** (pi'raitiiz) – iron sulphide, a mineral with gold-coloured marks on it.

pyro-/ – burn, heat, e.g. **'pyro'clastic rocks** ('pairo'klæstik) ("fire-broken") – rocks made of broken pieces of substance blown out from a volcano.

'pyroce'ram ('pairosə'ræm) – very tough, heat-resisting substance made from glass used (e.g.) for the nose-tips of rockets.

pyro-electricity – If tourmaline (or certain other crystals) is heated, one end becomes positively charged and the other end negatively charged. During cooling the charges are the other way round.

'pyro'gallol ('pairo'gælɔl) – $C_6H_3(OH)_3$; formed from gallic acid at 200° C., used in photography, and for absorbing free oxygen.

'pyro'ligneous acid ('pairo'ligniəs) – the acid-vapour which is produced when wood is heated with too little air for it to burn. It contains acetic acid, methyl alcohol (wood-spirit), and other substances.

'pyro'lusite ('pairo'luusait) – manganese ore, MnO_2.

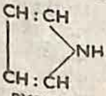
py'rolysis (pai'rɔlisis) – breaking up a substance by heat.

py'rometer (pai'rɔmitə) – instrument for measuring high temperatures from a distance, e.g. based on the fact that heating the joining-place of two metals produces an electric current; or based on the different expansion of two pieces of different metals joined at their sides so that the greater expansion of one causes the joined sheet to curve.

pyro'metric cones (pairo'metrik kounz) – cones put in a furnace, e.g. for firing (heating) pottery; they melt at different temperatures; when cone (1) melts and bends over, the furnace is hot enough: if cone (2) melts it is too hot.

'pyrotron = ↓ mirror machine.

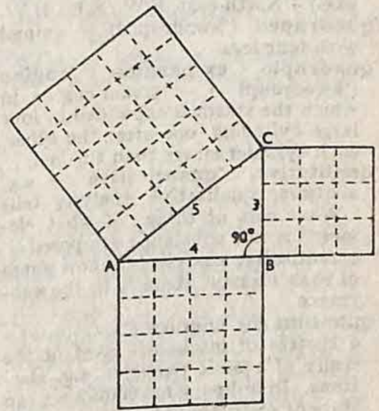
'pyrrole ('piroul) – a colourless substance obtained from bone oil, or coal tar. **pyrrole ring** – a ring of 4 carbon atoms and 1 nitrogen atom found in chlorophyll (the green substance of plants) and in ↓ haem (the red substance of blood). ↓ porphyrin.



PYRROLE

py'ruvic acid (pai'ruuvik) = **pyro-racemic acid**, $CH_3.CO.COOH$. In muscular activity and in the brain glycerol is broken down to pyruvic acid, and this is broken down into lactic acid (as in sour milk, $CH_3.CH(OH).COOH$). ↓ Vitamin B_1 is necessary to this process.

Py'thagoras' theorem (pai'θægərəs -) – In a right-angled triangle ABC with the right-angle at B, $AC^2 = AB^2 + BC^2$. In the right-angled triangle shown, $5^2 = 4^2 + 3^2$.



PYTHAGORAS' THEOREM

Q

Q_1, Q_2, Q_3 – ↓ quartile.

quadr-/ (kwɔdr-) – four, e.g. **'quadri'lateral** – 4-sided (figure).

'quadrant – quarter of a circle: piece of stone so shaped; control lever of aeroplane which moves through 90°.

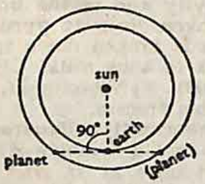
qua'dratic e'quation (kwɔ'drætik -) – equation containing x^2, e.g.

$$x^2 + 2x - 8 = 0$$
$$\therefore (x - 2)(x + 4) = 0$$
$$\therefore x = 2 \text{ or } - 4.$$

qua'dratic 'function – a relationship of the form $y = ax^2 + bx + c$; (a, b, and c are constant numbers).

'quadrature ('kwɔdrətjuə) – (1) position of the moon or a planet as shown overleaf; (2) process of finding the area of a figure, e.g. of a circle (e.g. by ↓ calculus).

'quadriceps muscle ('kwɔdriseps -) – muscle at the front of the upper half of the leg; it straightens out the leg.



QUADRATURE

'quadri'lateral points (of the compass) – North-east, S.W., S.E., N.W.

'quadruped ('kwɔdruped) – animal with four legs.

'quadruple ex'pansion 'engine ('kwɔdruupl -) – steam-engine in which the steam is expanded in four large cylinders, one after the other, each cylinder larger than the last.

'qualitative, 'quantitative – e.g. analysis; qualitative analysis tells "What sort of thing; of what elements is this substance composed?" Quantitative analysis tells how much of each element there is in the substance.

quantum me'chanics ('kwɔntəm-) – a system of mechanics used in the study of atomic particles, e.g. electrons. In ordinary mechanics we can state or calculate the position, speed (etc.) of a thing (e.g. a ball) accurately enough for all purposes although no measurements are completely exact. In the mechanics of very small particles, the inexactness is great (in proportion) and we can only say that the position (etc.) is This ± (plus or minus) That, i.e., we can only give *probable* positions and speeds. This is called the **Uncertainty Principle.** Small particles behave in some ways as if they are waves (compare light-waves which, at times, behave as particles; ↓ photon). In quantum mechanics we deal with the wave-behaviour of a particle and can calculate where most of the particles will be, and so find the probable position of one particle.

'quantum theory – The amount of energy which is radiated from a hot body (↓ black Body) or a lamp does not come in a steady flow, but in "drops" of energy called "quanta". These quanta are of different sizes, according to the frequency of the radiation; e.g. a quantum of red light is less than a quantum of blue light. ↓ Planck.

'quarantine ('kwɔrəntiin) – system of preventing the spread of an illness by keeping apart all persons who are likely to have caught the disease.

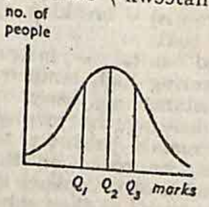
'quartan ma'laria ('kwɔɔtən -) – malaria in which the fever comes every fourth day.

quarter-wave plate – a thin piece of ↓ quartz, cut in a certain way, of such thickness that when a ray of light is sent on to it, the ray is split into two (↓ double refraction) and one ray loses (falls behind) a quarter of a wavelength on the other.

'quartic equation – mathematical equation which brings in powers of x up to x^4, e.g.

$$x^4 - 2x^3 + 3x^2 - 5x + 1 = 0.$$

'quartiles ('kwɔɔtailz) – divisions of a distribution (as shown): Q_1 is a line such as 25% of the *measures lie below it; Q_2 is a line such that 50% of the marks lie on each side of it. The highest 25% of the marks lie above Q_3: (*marks, heights, yearly incomes of money, etc.).



QUARTILE

'quarto ('kwɔɔtou) – sheet of paper folded so as to make 8 pages, e.g. **crown 4to** = crown paper (15 × 20 inches) folded to make 8 pages.

quartz (kwɔɔts) – crystallized silica, a common form of crystalline rock.

'quartzite – rock formed by heat and pressure from other silica (sand) rocks.

quasi-/ (kweisai-) – as if; not really . . . but treated as . . ., e.g. **'quasi-'optical waves** – very short electric waves which may be treated as (which obey the laws of) light waves.

qua'ternary (kwə'təənəri) – four, fourth. **Quaternary period** – the latest period in the development of life on the Earth, from one million years ago up to the present. In it living things have been very much as they are today. The first part of the period is called ↓ Pleistocene, and the second part Holocene (= period of full development).

queen posts – extra posts added at the side of the ↓ king post in a roof.

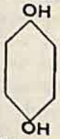
quench (kwenʃ) – put out a light; cool hot metal quickly in water or oil.

'quicklime ('kwiklaim) – CaO; limestone heated to drive off the carbon dioxide (CO_2); with water it forms ↓ slaked lime, as used with sand for joining bricks in building.

qui'escent (kwai'esənt) – not active, quiet.

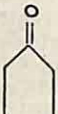
'quinine ('kwiniin) – substance obtained from the bark of the cinchona tree; used as a medicine in malaria. **quinidine** is an ↓ isomer.

qui'nol – substance used in developing photographic films. It produces a very black-and-white negative (developed film); a benzene ring with two OH groups as shown. It is also called hydroquinone.



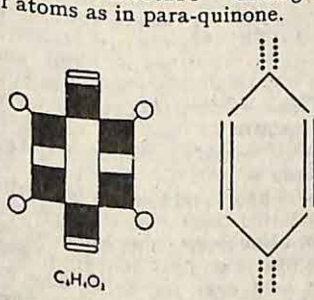
QUINOL

qui'nones (kwi'nounz) – substances made from benzene (and similar compounds of carbon and hydrogen) by replacing 2 hydrogen atoms by oxygen atoms. The quinones are very important colour-forming compounds used in dye manufacture. **para-quinones** are yellow; **ortho-quinones** are red.



QUINONE

quinonoid structure – arrangement of atoms as in para-quinone.



$C_4H_4O_2$

para-quinone

quinonoid

QUINONOID

quinque (kwiŋkwi) – **quint-/-o-/** – five, e.g. **'quinque'foliate** – having leaves (or leaflets) grouped in fives. **quintuple** – five times, five-fold.

'quinsy ('kwinzi) – abscess (infected inflammation round the ↓ tonsils (the two small masses seen hanging down at the back of the throat).

'quintile ('kwintail) – Similar to ↓ quartile, but the division is into five parts.

'quire (kwaiə) – 24 sheets of paper.

'quoin ('kɔin) – outstanding angle of a building.

quo'tidian malaria (kwɔ'tidiən) – malaria causing attacks every day.

R

r – ↓ racemic.

R.A. – ↓ right ascension.

R.F. – ↓ radio frequency.

R.M.S. – ↓ root mean square.

R.N.A. – ↓ ribonucleic acid.

R.R. alloy – = Hiduminium R.R. alloy, aluminium with copper, magnesium, zinc, and other metals; by weight it is one of the strongest metals in ordinary use; used e.g. for pistons of aeroplane engines.

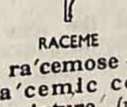
Ra – chemical sign for ↓ radium.

'rabbet plane ('ræbit -) – tool used for cutting a groove, or a step along the edge of a piece of wood. ↓ rebate.

'rabies ('reibi.iiz) – ↓ hydrophobia.

race, 'ball-race – circular groove in which ball - bearings run.

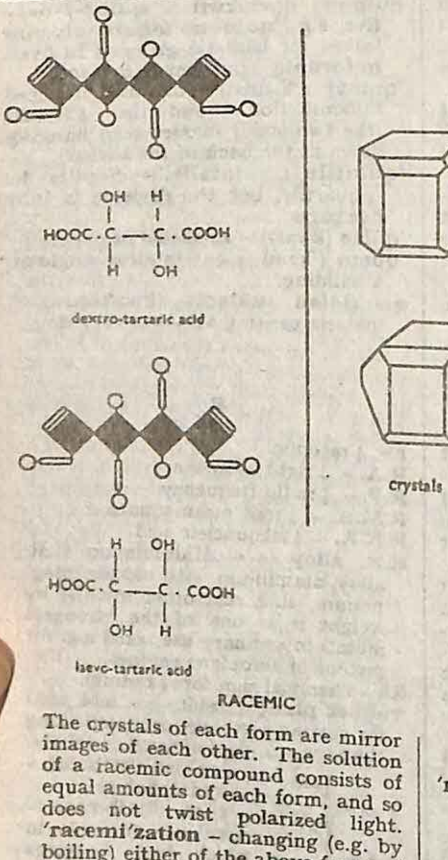
ra'ceme (ræ'siim) – group of flowers arranged on a main stem in which the lowest flowers open first.



RACEME

ra'cemose – like a raceme.

ra'cemic compound, racemic mixture (ræ'siimik) – substance (e.g. one form of tartaric acid) which is made up of a mixture of two forms. The solution of one of these forms twists ↓ polarized light to the right (dextro-/); the solution of the other form twists it to the left (laevo-/).



dextro-tartaric acid

laevo-tartaric acid

crystals

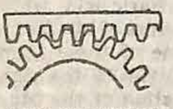
RACEMIC

The crystals of each form are mirror images of each other. The solution of a racemic compound consists of equal amounts of each form, and so does not twist polarized light. **'racemi'zation** – changing (e.g. by boiling) either of the above forms of a substance into a mixed form which does not twist polarized light. ↓ meso.

ra'cemose – ↓ raceme.

rachi-/-o-/ (ræki-) – of the spine. **'rachis** – the spine; the main stem of a group of flowers; the "stem" of a feather.

ra'chitic (ræ'kitik) – of ↓ rickets.



RACK AND PINION

rack – a part of a gear-wheel (not a whole circle). **rack and pinion** – a toothed bar acting on (or acted upon by) a small gear-wheel. **rack-railway** – railway up a mountain-side working with a rack and pinion.

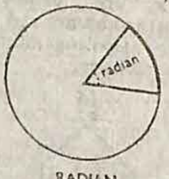
'racon ('reikɔn) – ↓ radar beacon. When a radar impulse from the ship reaches the racon it causes the racon to send out a set of signs telling which racon it is, so that a ship (or aeroplane) knows its position.

rad – unit for measuring an amount of ionizing radiation (e.g. from a radio-active substance).

'radar ('reidaa) – (**Radio-Directing And Ranging**): a way of finding the distance and direction of objects (e.g. aeroplanes). Radio pulses are sent out and are reflected back from the object. The return pulses are seen on a screen like that of television. Radar is also used by ships, e.g. to "see" in bad weather.

'radial ('reidiəl) – of a radius (line from the centre of a circle to the circumference). **radial engine** – engine as in many aeroplanes in which the cylinders are arranged in a circle round the shaft (axle driven by the engine).

'radian ('reidiən) – unit of circular measure. Measure off on the circumference of a circle a length equal to the radius (see diagram): the angle at the centre of the triangle so formed = 1 radian = 57·3°; 1° = 0·017 … radian; π (3·14 …) radians = 180°.



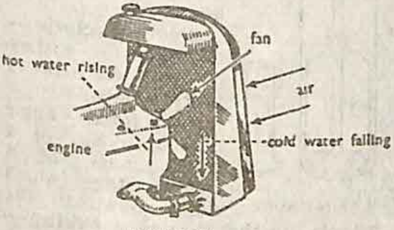
RADIAN

'radiant heat ('reidiənt) – heat which is radiated (sent out) through space from a hot Body (compare light from a lamp); e.g. heat felt from a hot iron held near the face. The heat received from the sun is radiant heat. ↓ convection.

'radiate ('reidieit) – send out energy, e.g. heat, light, radio, X-rays, in the form of waves.

radiation sickness – disease due to receiving large amounts of ionizing radiation (e.g. from radioactive substances).

'radiator – instrument for sending out heat into the air, e.g. a hot water (or steam) radiator for house-warming. **radiator** of a car – see picture.



RADIATOR

'radical ('rædikl) (chemistry) – group of atoms which is found unchanged in a number of compounds and which acts like a single atom; e.g. the nitrate radical $-NO_3$ in silver nitrate ($AgNO_3$), sodium nitrate ($NaNO_3$), potassium nitrate (KNO_3), etc. The sign R means any hydrocarbon radical; so R.OH means CH_3OH or C_2H_5OH, etc. Also spelt radicle.

'radical (mathematics) – the sign $\surd$, meaning "Take the square ↓root of," e.g. $\sqrt{9} = 3$, or -3; ($3 \times 3 = 9$, $-3 \times -3 = 9$).

'radicle ('rædikl) – root of a young plant or of the ↓embryo inside a seed.

radio-/ ('reidio-) – (1) of rays, by rays, e.g. **'radio'therapy** (-'θerəpi) – treatment of disease by means of rays (of light or heat); (2) of radio (wireless); (3) radioactive form of an element, e.g. **radio-carbon, radio-iodine,** etc., used e.g. in learning the path of elements through the body.

'radioactive (substance) – substance whose atoms break up of themselves (not because of an outside force) and, in breaking up, send out electrically charged particles, and change into other (different) atoms.

radio-astronomy – study of radio waves from heavenly Bodies, e.g. from the sun and **radio-stars.**

'radio 'frequency – frequency used in radio, about 10,000 (or more) cycles per second.

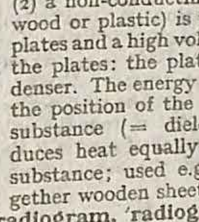
radio frequency heating, R.F. heating – (1) By means of a coil round the container of the metal, an alternating current is induced (caused) in the metal to be heated. Heat is produced by this induced current in much the same way as heat is produced in a wire in which an ordinary current flows. This system is used in manufacturing metals and it produces a surface-heating (not equally all through); (2) a non-conducting substance (e.g. wood or plastic) is put between two plates and a high voltage is put across the plates: the plates act as a condenser. The energy used in changing the position of the molecules in the substance (= dielectric loss) produces heat equally throughout the substance; used e.g. in glueing together wooden sheets.

'radiogram, 'radiograph – an X-ray photograph.

'radio'laria ('reidio'leəriə) – small star-shaped, one-cell sea-creatures; their frame-work left after death forms a red clay (**radiolarian ooze**) in the sea, and a rock, **radiolarite.**

'radiolo'cation – = ↓radar.

radi'ometer – (1) instrument for measuring radiation; (2) a wheel, as shown, in a partial (but not complete) vacuum; one side of the outstanding pieces (paddles) on the wheel is black, the other bright. The black sides absorb heat, and the increased activity of the particles of air on that side causes the wheel to turn.



RADIOMETER

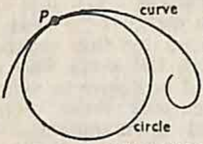
radio-telescope – radio receiver, often with a very large aerial, used in ↓radio-astronomy.

'radium ('reidiəm) – radioactive metal-element; chemically similar to calcium.

'radius ('reidiəs) – straight line from the centre of a circle to the circumference; the length of this line.

radius (bone) – the smaller curved bone of the lower arm. ↓ulna.

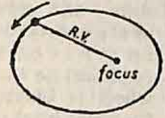
radius of curvature – To measure the amount of curving at a point *P* on a curve, draw a circle which fits the curve near *P*. The radius of the circle is the radius of curvature of the curve at *P*.



RADIUS OF CURVATURE

radius of gy'ration (- dʒai'reiʃən) – First see moment of inertia. The mass of a turning Body (e.g. a wheel) is spread out at different distances from the axle. Imagine all the mass to be at one distance from the axle so that the moment of inertia is the same as that of the actual Body. This distance is the radius of gyration.

'radius 'vector (- 'vektə) – If one Body moves in an ↓ellipse about another Body at the focus (like a planet moving round the sun) a line joining the Bodies is a radius vector.

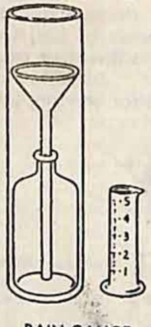


RADIUS VECTOR

'radix ('reidiks) – ("root"): place from which a certain part of the body (e.g. nerve, blood-vessel) starts (thought of as if it were growing out from there).

'radon ('reidɔn) – a radioactive gas given out by radium.

'rafter ('raaʃtə) – cross beam under a roof; the rafters carry the roof-covering (e.g. tiles). ↓purlins.



RAIN-GAUGE

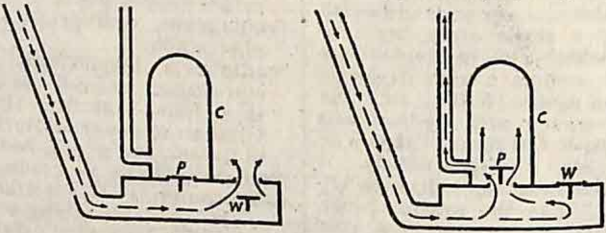
'rain-gauge (- geidʒ) – instrument used for measuring the amount of rain which has fallen in a certain time, e.g. 24 hours.

raising (cloth) – combing the surface of cloth to make a hairy surface.

rake (reik) – angle of slope, e.g. of a ship's mast, of a theatre stage (which slopes down to the people in the theatre). **raking** – sloping, e.g. **raking prop, raking shore** – sloping support beam.

rale (raal) – noise heard by a doctor in a diseased lung.

ram (hydraulic) (ræm) – form of water-pump used where there is plenty of water flowing down-hill. The weight of the down-flow is used to force a smaller quantity to a greater height, e.g. for use in a house. The rush of water through the Waste valve closes the valve; this causes back pressure which opens the Pressure valve and water is forced into the Container and up the pipe. The pressure has been eased, so **P** falls back, and **W** opens again . . . and so on.



RAM (HYDRAULIC)

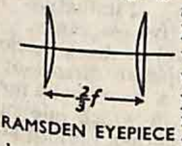
ram jet – kind of ↓jet engine used at high speeds in which air is rammed (forced) into the front of the engine by the forward motion of the aircraft and is then heated and blown out at the back.

'Raman effect ('raamən -) – Light of one wavelength, e.g. from a mercury lamp, is passed into a liquid or gas. The molecules of this liquid scatter the light sideways. The ↓ spectrum shows a certain bright line and (beside it) a number of other, broader lines of (mainly) longer wavelengths than that of the main line. These side lines are caused by the particles of light striking against the molecules of the liquid and gaining or losing energy in doing so. (Indian, 1888–.)

rami-/ branch. **'ramify** (ræmifai) – to spread out into branches. **'ramose** ('reimous) – with many branches.

'ramie thread ('ræmi) – thread made from the fibres of China grass; like linen-thread (from flax), but coarser; the strongest natural fibre, but difficult to spin.

ramp (ræmp) – slope, e.g. steep sloped path up which heavy things are pulled on to a higher level.



RAMSDEN EYEPIECE

'Ramsden 'eye'piece ('ræmzdən -) – arrangement of 2 lenses (as shown) with cross wires, used as the eyepiece of (e.g.) a microscope or a telescope. (The lenses have equal ↓ focal lengths and their distance apart is $\frac{2}{3}$ of the focal length of either.)

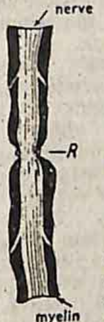
'ramus ('reiməs) – any branch-like thing.

rank corre'lation – Two sets of measures (e.g. marks in two school subjects) are arranged in order of rank (1st, 2nd, 3rd . . .). A rank correlation shows how far it is probable that a boy who is first in (e.g.) Latin will be 1st (or near the top of the class) in another subject, e.g. Arithmetic. The formula is:

$$1 - \frac{6\Sigma (x - y)^2}{N(N^2 - 1)}.$$

Here $(x - y)$ means difference of Latin order from Arithmetic order; this is squared. So also for the orders of all the boys. Σ means add all these together. Multiply the total by 6. Divide by N (number of boys) × $(N^2 - 1)$. Subtract the result from 1. The answer will be a figure between +1 (complete agreement in all cases, 1st in Arithmetic, 1st in Latin: 2nd, 2nd; etc.) and −1 (top in Arithmetic, bottom in Latin).

'Rankine cycle ('ræŋkin- saikl) – set of processes as in a steam-engine: (1) water is pumped from condensers (see 4) into boiler; (2) water is boiled and steam passes into cylinder; (3) steam expands (↓ adiabatically) and pushes the piston; (4) used steam changes back into water in the condenser.



RANVIER'S NODES

'Ranvier's nodes (rɔnviez noudz) – narrowing of the myelin (outer fatty covering of a nerve fibre) at regular intervals. The nerve impulse decreases as it passes between the nodes but increases as each node is passed – as if the nerve impulse were relayed (sent on with new energy) at the nodes.

ra'pport, en- (ræ'pɔə, ɔn) – in touch with, answering to the suggestions of a person, e.g. in the case of a doctor using ↓ hypnotism in treating mental or nervous disorder.

rare earths – oxides of the group of metal elements which includes ↓ cerium and about 16 similar elements.

'rarefi'cation (of air) ('reərifi'keiʃən) – decrease to a lower pressure; e.g. the air high up above the Earth is **rarefied.**

rare gases – very inactive gases in small amounts in air (helium, neon, argon, krypton, xenon); ↓ radon also belongs to this group of elements.

/**-ras-**/ (-reis-) – rub away, scratch, e.g. **a'brasive** – substance used for rubbing away a surface or polishing, e.g. sand: so also **erase** – rub out.

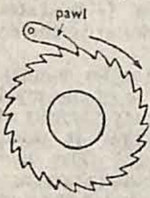
rash (ræʃ) – redness of the skin caused by an illness or disease (e.g. measles, chicken-pox, etc.).

rasp (raasp) – tool like a very rough

RASP

file, but with teeth (not cut lines) for use on wood, leather (shoe-maker's rasp) or in shoeing horses (farrier's rasp). The shoemaker's and farrier's rasps have two different roughnesses on each side.

'raster ('ræstə) – a set of parallel lines; e.g. the set of cross lines on which a television picture is built up.



RATCHET

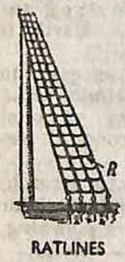
'ratchet ('rætʃit) – a gear-wheel with sloping teeth, as shown: a **pawl** (pɔɔl) prevents the wheel from turning round the other way; used e.g. in the winding of a clock.

'rated horse-power ('reitid -) of an engine – the power which the makers say it will produce under ordinary conditions: (it may produce more, but not safely, or not without waste of coal (or oil)).

'ratio ('reiʃiou) – comparison between two numbers or between two similar quantities; proportion as shown by a fraction, e.g. the ratio $8 : 16$ is $\frac{1}{2}$.

'rationa'lizing – thinking out a reasonable explanation for one's own unreasonable behaviour (due in fact to emotional causes).

'rational number ('ræʃənəl -) – number which can be written as a fraction, e.g. $3\frac{1}{2}$ ($= \frac{7}{2}$) but not $\sqrt{2}$. ↓ irrational.



RATLINES

'ratlines, ratlins, rattlings ('rætlinz) – the cross ropes acting as steps by which a seaman gets up to the top of the mast.

ra'toon (ræ'tuun) – new growth coming from the stem of a plant which has been cut down (e.g. cut sugar-canes).

ra'ttans (ræ'tænz) – canes (easily bent stems) obtained from climbing plants used (e.g.) for seats of chairs.

'Rawlplug ('rɔɔlplʌg) – trade name for a tube of fibre put into a hole: a screw put into the tube expands the tube so that both are firmly held in the wall.

ray 'floret (- 'flɔret) – one of the small flowers on the edge of a compound flower (e.g. a daisy) which bears an easily seen petal.

'Raynaud's disease ('reinouz -) – disorder of the blood supply to the fingers, toes (sometimes also ears, and lower jaw), usually in women aged about 50. ↓ menopause.

'rayon ('reiɔn) – artificial silk made by various chemical processes, e.g. ↓ viscose.

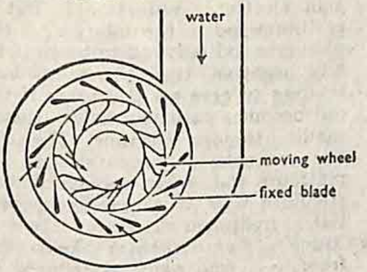
Rd – radio-substance produced by the breakdown of a radioactive substance; e.g. RdTh = radio-thorium, substance produced when thorium (a radioactive element) breaks down by sending out rays.

re'actance (rii'æktəns) – measure of the power of coils and condensers to oppose the flow of alternating current (in addition to their ordinary resistance). The combined effect of the reactance and the resistance is the **impedance.** ↓ inductive reactance, capacitative reactance.

re'action (rii'ækʃən) – back action, acting in the opposite direction: – (1) (chemistry) – a loose word for a chemical process in which one substance acts on another. (2) (maths and mechanics) – If a book rests on the table, its weight pushes downwards and the table pushes back on to the book; if a magnet pulls a piece of iron, the piece of iron also pulls the magnet. Such a force which pushes (or pulls) back when one Body acts on another is called a reaction. (3) (radio) – a system used in some radio sets or *amplifiers in which part of the current coming out of a valve (in the *anode circuit) is used to strengthen the incoming current (in the *grid circuit). Also called **retroaction** and **regeneration.** *(see triode).

re'action time – time between hearing (or seeing) some sign and reacting to it (doing some action called for by the sign).

re'action 'turbine (- 'təəbain) – turbine = engine in which turning power is produced directly by a stream of water or gas or steam flowing through it. In an ↓impulse turbine the water (steam, gas) strikes the blades of a wheel and pushes them round. In the reaction turbine water (steam, gas) is driven out from narrow openings set round a wheel, and the wheel turns backwards as the water (steam, gas) goes forwards. Compare a Catherine Wheel (firework which spins round as it burns).



REACTION TURBINE

re'actor (nuclear) (rii'æktə) – machine in which uranium or plutonium atoms are made to split up in a controlled way so as to produce heat or atomic radiations (or new fissile substances). In a **slow reactor** the atoms are split by neutrons which have been slowed down by a **moderator** (e.g. graphite or water). In a **fast reactor** the neutrons are not slowed down. Heat is removed from a reactor by cooling substances (e.g. carbon dioxide, water, melted sodium). In some reactors the process is controlled by **control rods** of, e.g., cadmium or boron which absorb neutrons. Also see breeder reactor.

re'agent (rii.'eidʒənt) – a substance which takes part in a chemical reaction.

real image – image, formed by a curved mirror or lens, which can be thrown on a screen; e.g. picture on a cinema screen, not image seen through a lens when used as a magnifying glass.

ream (riim) – 480 sheets of paper: (printer's ream, 516).

'reamer ('riimə), **'rimer** ('raimə) – tool used for making a hole larger or for making a hole wider at one end than at the other; it is pushed in and turned so as to cut away the inside of the hole.

'Réaumur ('reiomiuə) (thermometer scale) – way of marking a thermometer in which 0° R. = freezing point of water and 80° R. = boiling point of water.

re'bate (ri'beit) – groove, e.g. in a wall into which a window or a door will be fitted. **rebate-plane** = ↓rabbet plane.

re'ceptacle (ri'septəkl) – enlarged end of a flower-stem to which the petals, etc., join.

re'cessive character, factor – ↓dominant.

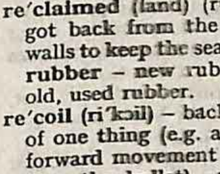
re'ciprocal (ri'siprəkl) – e.g. the reciprocal of 4 = $\frac{1}{4}$; so also of 5 is $\frac{1}{5}$, etc.

re'ciprocating 'engine – engine which makes a backwards and forwards movement of a piston; e.g. a steam-engine but not a turbine.

re'claimed (land) (rii'kleimd) – land got back from the sea by building walls to keep the sea out. **reclaimed rubber** – new rubber made out of old, used rubber.

re'coil (ri'kɔil) – backward movement of one thing (e.g. a gun) due to the forward movement of another thing (e.g. the bullet). **re'coil es'capement** (- es'keipmənt) – ↓escapement used in cheap clocks; the pallets (hammers which catch the wheel) are so shaped that the escape wheel does not go steadily round, but round, then back a little, at each movement.

're'crystallize – dissolve crystals and allow them to form again as a way of making substances pure.



RECTANGULAR COORDINATES

rec'tangular co'ordinates (rek'tæŋgjulə kou.'ɔɔdinətz) – way of describing the position of a point by measuring from lines at right angles to each other; thus the position of *P* is + 5 in the X direction and + 3 up in the Y direction.

rec'tangular figure – figure which has four right angles, e.g. a square. **rectangular hyperbola** – ↓ hyperbola whose cross lines (asymptotes) are at right angles to each other.

recti-/ ('rekti-) – right, straight.

'rectifi'cation – (1) (of a liquid) purifying by changing from liquid to vapour and back to liquid; (2) (electric) changing alternating current into a direct current: this may be done (e.g.) by cutting out half of each wave, e.g. with a ↓ diode valve; (3) (mathematics) process of finding the length of a curved line by dividing it up into an infinite (uncountable) number of short straight lines. ↓ calculus.

'recti'linear ('rekti'liniə) – having straight lines; composed of straight lines. **rectilinear lens** – lens which shows straight lines as straight in a photograph. **rectilinear propagation** (of light) – the travelling of, or sending out, of light in straight lines (not, e.g., as in ↓ diffraction).

'rectum ('rektəm) – the lowest, straight piece of the bowel leading to the anus (outlet).

re'cuperate (ri'kjuupəreit) – recover strength after an illness. **re'cuperator** – set of pipes by which the outgoing hot gases of an engine heat the incoming air.

Red Giant star – ↓ Giant.

redia (riidiə) – ↓ cercaria.

red lead – lead oxide, Pb_3O_4; poisonous red powder used in paint, also to protect seeds against insects.

'redox ('riidoks) – short for **Reduction-Oxidation**. Oxidation means increase of the valency (joining power) of a metal. E.g. Fe = iron; $FeCl_2$ = ferrous chloride; here iron has a valency of 2; but $FeCl_3$ = ferric chloride; here iron has a valency of 3. Reduction means decrease in valency. In oxidation ($FeCl_2 \rightarrow FeCl_3$) the iron atoms become more electrically positive ($Fe{+}{+} \rightarrow Fe{+}{+}{+}$): that means they lose negative charges. In reduction, the iron atoms become less electrically positive, gain negative charges.

redox po'tential – See redox above. Suppose we have a solution containing ferric chloride ($FeCl_3$) and ferrous chloride ($FeCl_2$). Does this solution tend to lose electrons (oxidation) or gain electrons (reduction)? Put a platinum rod in the solution; if the platinum rod is found to be electrically negative, then the solution is tending to give up electrons; if the rod becomes positive, the solution is tending to gain electrons. The electric potential (pressure) of the platinum rod, when measured in a standard way, is the redox potential. ↓ hydrogen electrode.

re'duce – (chemistry): (1) take oxygen from, e.g. iron oxide is reduced to iron in getting iron from iron ore; (2) add hydrogen to: sometimes both (1) and (2) happen, e.g. nitrobenzene, $C_6H_5NO_2$, can be reduced to aniline, $C_6H_5NH_2$; (3) change a compound in which a metal has a high valency (joining power) into one in which the metal has a lower valency; e.g. ferric chloride ($FeCl_3$) can be reduced to ferrous chloride ($FeCl_2$): the valency of iron (Fe) is here reduced from 3 to 2.

re'ducing agent – substance which causes chemical reduction, e.g. taking oxygen from another substance: thus, tin oxide (tin ore) is heated with carbon (e.g. coal) to form tin; carbon is here the reducing agent. ↓ reduce.

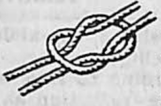
re'duction di'vision – division of a cell in which the number of the ↓ chromosomes (character-bearing units) is halved. A sex-cell (male or female) has only half a set of chromosomes, as the other half comes at fertilization. ↓ meiosis.

re'dundant (ri'dʌndənt) – A frame (e.g. of a bridge) is called redundant when it contains more beams than those necessary to prevent it from going out of shape.

reed (weaving) – the comb-like part of a loom which is moved back to press each cross-thread into place just after it has been woven.

reef – line of rocks under the sea; layer of ore in a mine.

reef knot – as shown; used to tie two ropes together.



REEF KNOT

re-'entrant angle (rii'entrənt -) – angle which bends inwards; opposite of salient.

re-entry – the return of a rocket or artificial satellite from a great distance above the Earth into the dense region of the Earth's atmosphere.

reeve – put a rope through a hole or ring.

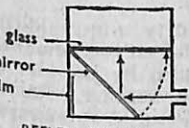
'reference point ('refərəns) – point from which distances are measured; so also **reference axis, reference plane.**

'reference system – ↓ co-ordinates; also ↓ relativity.

'reflex ('riifleks) – springing back into shape after bending. **reflex ratio** – relationship of the flex (bending) to the reflex (spring back) as a measure of springiness, e.g. of the air-screw (propeller) of an aeroplane.

'reflex action – action such as coughing, shutting one's eyes when something is likely to hit them, curving the foot downwards when the bottom of it is touched. Such actions are caused by an impulse into (and out from) the central nervous system often without control or even consciousness of it in the higher brain centres. A **spinal reflex** passes in and out of the spine without going as far as the brain. **axon-reflex** – (e.g. the reddening of the skin round a cut or wound). Here the chemical substance set free in the cut causes an impulse to pass in and out through the branching of the nerve-cell without passing through the cell itself.

'reflex camera – photographic camera in which the light from the lens falls on a mirror which reflects it on a glass plate in the top of the camera, so that the user can see just what picture he will take. The mirror swings up just before the picture is taken.

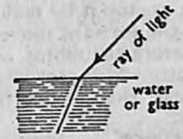


REFLEX CAMERA

re'flexed (part of a plant or of the body) – turned back at a sharp angle.

'reflux valve ('riiflʌks -) – valve to prevent water from flowing back in an upward leading pipe. **re'fluxing** – boiling a liquid in a vessel with a pipe which leads the vapour back to the liquid, e.g. in making alcoholic spirits (e.g. whisky).

re'fraction (ri'frækʃən) – bending of a ray of light when passing from one substance to another, e.g. from air to water.



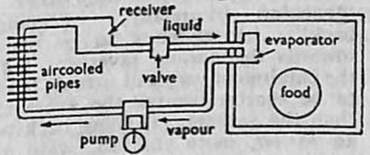
REFRACTION

re'fractive 'index – ↓ index of refraction.

re'frac'tometer – instrument for measuring the ↓ index of refraction: (there are several kinds).

re'fractories (ri'fræktəriz) – heat-resisting substances (e.g. clay, silica) used to make a lining for a furnace in which metal is extracted from ore, or in which steel is made.

re'frigerator (ri'fridʒəreitə) – Machine for freezing or keeping food (etc.) cold. When a liquid becomes vapour it takes up heat, e.g. when water evaporates from your skin you feel cold. In a refrigerator vapour is compressed so that it becomes liquid; the liquid is cooled by air; the cooled liquid then evaporates and takes heat from the container in which the food (etc.) is kept. The vapour is then compressed again, as above.



REFRIGERATOR

re'fringent ('ri'frindʒənt) **substance** – substance which causes ↓ refraction (bending of light as it passes from one substance into another, e.g. from air not water).

'rege'lation (riidʒe'leiʃən) – ("freezing again"): process in which ice or snow melts under pressure and freezes again when the pressure is taken away. The forming of a mass of ice under a boot when walking in snow is caused by regelation.

re'gene'ration (radio) (ri'dʒən-) = ↓reaction.

re'generative braking – system in which an electric train is braked so as to slow it down or stop it by making the energy of the forward movement of the train work the motor, so generating electricity which goes into the power-rail and thus helps to move other trains.

re'generative 'furnace – furnace whose hot gases are used to heat the incoming air.

regenerative reactor – ↓breeder reactor.

'register ('redʒistə) – plate in a chimney which can be closed to lessen the opening.

'register 'chisel (-'tʃizəl) – chisel thicker than a ↓firmer chisel.

'registering (in printing) – causing the different colours of a colour print to be exactly on top of each other.

re'gression (ri'greʃən) – ("going back"): (1) tendency to go back towards the normal (average), e.g. the children of very tall parents tend to be shorter (nearer the average) than the parents; (2) going back to an earlier, more childish, state of mind, e.g. as a result of (or as part of) mental disorder.

regression equations – Example: – A man's weight partly depends upon his height but there is not exact agreement between weights and heights of men. (The amount of agreement can be expressed as a ↓correlation coefficient.) From measures of the weights and heights of a large number of men we can make mathematical statements to show (1) how weights, on the average, depend upon heights, (2) how heights, on the average, depend upon weights. These two statements of the relations between weight and height are regression equations; the graphs of these equations are regression lines. (If weights and heights were in exact agreement the two equations and lines would be the same.) So also for other measures which are partly related, e.g. ability in English and intelligence.

'regular – (1) according to rule, e.g. **regular reflection** – reflection, as by a mirror, according to the laws of reflection. (Reflection by a rough surface is irregular.) (2) even, the same on all sides, e.g. **regular polygon** – a plane (flat) figure with many *equal* sides. **regular crystal system** – ↓cubic.

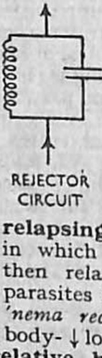
'regulus ('regjuləs) – old name for antimony.

re'gurgi'tation (ri'gəədʒit-) – flowing back of a liquid in the direction from which it first came, e.g. of food into the mouth, of blood into the heart.

'rehabili'tation ('rihæbili'teiʃən) – process of training a person, who has been ill or wounded, to work and take his place in the world again.

'rein'force ('rii.in'fɔɔs) – make stronger, e.g. **reinforced concrete** – cement strengthened with steel bars.

re'jector circuit (ri'dʒektə -) – arrangement of a coil and a condenser as shown. It has a very large resistance for alternating current of one particular frequency (according to the sizes of the coil and the condenser).



REJECTOR CIRCUIT

re'lapse (ri'læps) – become ill again after having got a little better.

relapsing fevers – a group of fevers in which the sufferer gets better, then relapses; caused by various parasites in the blood (e.g. *'Trepo'nema recur'rentis*, carried by the body-↓louse.)

'relative hu'midity (-hju'miditi) – Humidity of the air = amount of water vapour held by the air: this varies with the weather. Relative humidity = amount of water vapour held by the air as a percentage of the greatest amount it can hold at that temperature.

'rela'tivity, Einstein's principle of ('ainstain) – Speed means length travelled in a certain time; force is measured by the rate of change of speed in a Body. But speed must be measured against a background, e.g. distance travelled by a car over the Earth in a certain time, distance travelled by the Earth in a certain time, measured against the background of the stars. We can only measure *relative* motion, i.e. motion measured against something else. The theory of relativity is a restatement of the laws of mechanics in such a way that they do not depend upon any background (reference system). The theory depends upon the idea (which seems to be true) that the speed of light, as measured by a man, in whatever way he is moving, is always the same. One result of the theory is that the mass of a Body varies with speed. This is found to be true of particles moving at very high speeds. ↓ Michelson Morley.

'relay ('riilei) – instrument which uses a small electric current to control a bigger electric current, e.g. instrument which receives a telephone- (telegraph-, radio-) message and sends it on with greater strength, or in a different form (e.g. radio → wire, or wire → radio).

re'mainder theorem (ri'meində -) – Example: What is the remainder if we divide $x^3 - 2x^2 + 5x - 1$ by $x - 1$? Put $x = +1$. Then $x^3 - 2x^2 + 5x - 1 = 1 - 2 + 5 - 1 = 3$. The remainder is 3. If we divide by $x - 2$, put $x = +2$; by $x + 3$, put $x = -3$, etc. The particular use of the theorem is to find if one expression can be exactly divided by another so that there is no remainder.

re'mission of fever (ri'miʃən -) – becoming less for a time (but possibly getting worse again later). **re'mittent,** adj.

re'mote con'trol (ri'mout -) – system by which a gun, aeroplane, etc. is controlled from a distance.

'renal ('riinəl) – of the kidneys.

'render ('rendə) – cover brickwork with cement or plaster.

'rennin – substance in the stomach liquid which causes milk to become solid.

rep, repp (rep) – cloth with hard ribs (raised lines) on the surface.

re'peater – (ri'piitə) apparatus put in a telephone circuit at intervals to strengthen the signal and so overcome losses of power along the telephone line.

re'pel (ri'pel) – push away, e.g. the north pole of a magnet repels another north pole, but attracts a south pole. **re'pellant** – substance which keeps insects away (but does not kill them), e.g. D.M.P. (dimethylphthalate).

re'placeable 'hydrogen – hydrogen atoms of an acid which are taken out (and metal atoms put in their place) when a salt is formed; e.g. acetic acid, $CH_3.COOH$; sodium acetate, $CH_3.COONa$.

re'poussé (rə'puuse) – ornament on a sheet of metal beaten out from the back.

re'pression (ri'preʃən) – the processes by which the mind drives out of the consciousness unpleasant memories or ideas.

'réseau ('rezo) – network of lines used e.g. in measuring distances in star-photography; network of stations for reporting changes in the weather.

re'section (ri'sekʃən) – cutting away part of a bone or other part of the body, e.g. resection of a rib done in case of a collection of pus (= infective matter) in the lung cavity after pneumonia.

'reserpine ('resəpin) – drug used for treating high blood pressure and as a tranquilizer (to produce calm in nervous and excited states).

re'sidual (re'zidjuəl) – left behind, remaining; e.g. **residual gas** in a radio valve or electric light bulb = gas left when as much gas as possible has been taken out. **re'sidual 'magnetism** – ↓ hysteresis curve.

re'silient (re'ziliənt) – springy, e.g. rubber is resilient. **re'silience** – the energy with which a substance goes back into shape after being pressed or pulled out of shape.

'resin, 'rosin ('rezin, 'rɔzin) – When a tree is cut a mixture of oil and resin comes out, e.g. turpentine (paint oil) and resin come out of a pine tree. As the oil evaporates and dries, resin gathers as a hard glassy coating on the wound of the tree; it serves the same purpose as a scab (mass of hardened blood) on a body-wound. Copals used for varnish are hard resins. Mixtures of hard resin and and oil are **'oleo'resins** ('oulio-), e.g. Canada balsam (used for sticking glass together in scientific work). Plastics are artificial resins; they are solids which are not crystalline, but consist (like natural resins) of very long chains of molecules. ↓-mer-/, polymerize.

re'sistance (ri'zistəns) – The electric resistance of a wire or circuit (measured in ohms) is found by dividing the pressure (voltage) by the current (amperes).

re'sistance thermometer – thermometer which depends on the change of electrical resistance of a wire (usually platinum) with temperature.

re'sistor – piece of wire (etc.) used in an electric circuit to offer resistance to the flow of current.

re'sis'tivity – measure of the electric resisting power of a substance. The unit is ↓ohms per centimetre of length of a bar of cross-area 1 square centimetre.

re'soles (re'soulz) – easily melted and dissolved forms of phenyl-formaldehyde plastic (Bakelite) used for paint and for sticking, e.g. sticking layers of wood together (laminated wood).

'reso'lution ('rezə'luuʃən) (1) (medical) – lessening of an inflammation; (2) (chemistry) – separation of the two forms of substance from a ↓ racemic mixture.

re'solving power of a lens (ri'zɔlviŋ) – power of showing fine details, e.g. in a camera or microscope.

'resonance ('rezənəns) – ("back sounding"). Anything which can vibrate has a natural frequency of vibration. If a force is applied at just this frequency, very large vibrations are caused: (compare pushing a child's swing just at the right moment). Resonance is the building up of very large vibrations in such a way.

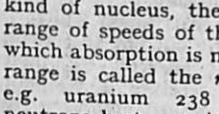
Sound – If sound waves fall on an object whose natural frequency is the same as that of the waves, the object is set in vibration and itself gives out sound. A large empty hall has much resonance; sound waves are not easily lost but make various objects **resonate.**

Light – If light of a certain frequency (e.g. light from a sodium flame) is passed through a vessel containing (e.g.) sodium vapour, the vapour absorbs the light and sends it out again in all directions. By comparison with sound-resonance this is called **optical resonance**; but it is now better explained by ↓Bohr's theory than by theories of vibrations.

Radio – If an alternating voltage (e.g. set up by radio waves) acts on a circuit whose natural frequency is the same, a very big current is set up. ↓acceptor circuit.

Neutron resonance – The nuclei of atoms can absorb neutrons, but, for each kind of nucleus, there is a certain range of speeds of the neutrons for which absorption is most likely; this range is called the *resonance band*; e.g. uranium 238 absorbs fast neutrons best, uranium 235 absorbs slow ones best.

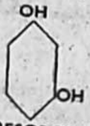
Electron resonance, proton resonance, magnetic resonance – A substance containing protons (in H atoms or ions) or unbalanced electrons (as in a ↓free radical), when placed in a magnetic field, resonates (reacts) to radio waves of a certain frequency and absorbs them. The effect can be used for measuring the strengths of magnetic fields.



RESONANCE

Chemical resonance – A benzene molecule can be pictured as having two possible forms (*A* and *B*) although these represent only one chemical substance. For picturing purposes we can think of the molecule as half-way between these two forms: this "halfway" form is sometimes drawn as *C*. There is said to be resonance between these forms (change from the one form to the other and back again). So also for similar substances for which there may be two (or more) resonant forms.

re'sorcin, re'sorcinol (re'zɔɔsin) – powerful antiseptic, used especially for diseases of the skin and hair; used also in making dyes.



RESORCINOL

'respi'ration ('respi'reiʃən) – *the taking in* of oxygen by an organism and the giving out of carbon dioxide.

'restiform ('restifɔɔm) – shaped like a rope.

'resti'tution, coefficient of ('resti'tjuʃən) – A steel ball bounces off a steel plate with a speed of about $\frac{9}{10}$ of the original speed. The coefficient of restitution of steel is 0·9. So also for other substances.

re'sultant (ri'zʌltənt) – ↓ forces, parallelogram of forces.

re'suscitate (ri'sʌsiteit) – bring a person back to consciousness after nearly drowning in water, or after electric shock.

re'tard (ri'taad) – slow down: (opposite to accelerate = speed up).

re'tarded child – child who has not reached the development of mind (or body) normal (average) at that age.

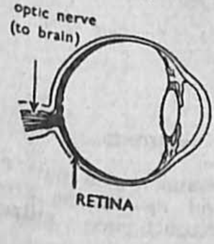
re'tarder – substance used to slow down a chemical action or the solidifying of cement.

re'tention (ri'tenʃən) – keeping back, not being able to let out, e.g. of urine.

re'ten'tivity – power of a magnet to hold some of its magnetism after the magnetizing force (e.g. a coil) is taken away.

re'tic-/- (ri'tik-) – like a net, e.g. **reticular, reticulate** – like a net, forming a network.

'retina ('retinə) – the light-sensitive layer of nerve endings at the back of the eye.



RETINA

re'tort (ri'tɔɔt) – vessel in which a substance is heated so as to drive off the vapour for distillation (*making it* liquid again); in making coal gas, the container in which the coal is heated to drive off the gas.

re'tractable (ri'træktəbl), **re'tractile** (-ail) – which can be drawn back, e.g. **retractable undercarriage** of an aeroplane – wheels which fold up into the body of the aeroplane when it is flying.

'retro-/ – (1) backwards, e.g. **'retrograde motion** ('retro-) – moving backward; **'retro'gression** – going back, becoming less highly developed; (2) behind – e.g. **'retroperito'neal** – behind the ↓ peritoneum.

retro-rocket – rocket which sends out its gases forwards and so slows down the Body which it is driving, e.g. for landing.

re'trorse, 'retro'verse (ri'trɔɔs, 'retro'vəəs) – pointing backwards.

'retting – rotting, causing jute (or flax) to decay so that the fibres can be pulled off to make gunny-fibre (or linen-fibre).

re'verbe'ration (ri'vəəbə'reiʃən) – movement of sound-waves to and fro as in a large hall so that the sound does not die away to silence at once.

re'verbe'ratory 'furnace – furnace in which the substance is heated by a flame passing above it, the heat being thrown down from a low roof; used in extracting some metals from their ores.

re'versal (ri'vəəsəl) – (photography): treating a photographic film so that the black of the thing photographed shows as black and the white as white – not opposite, as in an ordinary negative. The process is used in colour photography.

re'versible chemical reaction – reaction which can happen in either direction, e.g. the chemical processes in charging and discharging a storage battery, but not the process in an ordinary (primary) battery.

re'versing 'layer – cooler outer layer of the sun which absorbs light of certain frequencies from the light produced behind it, so that there are dark lines in the sun's spectrum.

Also called **chromosphere.** ↓ Fraunhofer.

re'vetment (ri'vetmənt) – strong wall built to keep up a bank of earth in its place.

'Reynolds' number ('renəldz -) – The behaviour of a small thing (e.g. a model of an aeroplane) when moving through a liquid or gas is not the same as that of a full-size thing. Reynolds' number is used in making a comparison between conditions for the motions to be similar. (It depends upon the size of the model, the speed of movement and the ↓ viscosity of the liquid or gas.)

Rh – chemical sign for ↓ rhodium.

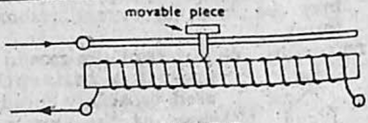
Rh (rh) factor – a substance found in the blood of ↓ Rhesus monkeys, and a similar substance found in the blood of certain humans. If an unborn child is Rh⊕ (has this substance) and the mother is Rh⊖ the mother forms in her blood a protective, anti-Rh substance. This substance may act against the blood of a second Rh⊕ child and destroy the child's red blood cells. This causes Icterus (= jaundice = yellowness of the skin) Gravis (serious) Neonatorum (= of newly born). The same effect may be produced if the Rh⊖ mother has had a blood-↓ transfusion of Rh⊕ blood at some earlier date.

rH value – a measure of oxidizing power. See **oxidize** (3). In the oxidation of a ferrous compound (e.g. ferrous chloride, $FeCl_2$) to the ferric compound (ferric chloride, $FeCl_3$), Fe++ becomes Fe+++, i.e., electrons are taken away from the iron atom. So also in other cases of oxidation. The rH value is a measure of the power of a substance to take away or give up electrons in this way.

rhabd-/-o-/ (ræbd) – rod, like a rod.

rheo-/- – flow, e.g. **rhe'ology** (rii-'ɔlədʒi) – the study of the flow of gases and liquids, e.g. of air-flow in flight, water-flow past ships.

'rheostat ('riiostæt) – instrument used to give different electrical resistances, e.g. the loudness control of a radio set.



RHEOSTAT

'rhesus monkey ('riisəs) – see picture, and Rh factor.

RHESUS MONKEY

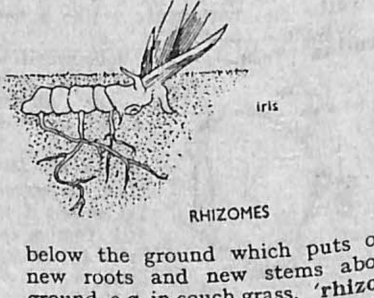
rheu'matic 'fever (ruu'mætik -) – serious form of **rheumatism** ('ruumətizm) (a disease causing pain and inflammation of the joints and muscles). In rheumatic fever the heart is often affected. **'rheumatoid ar'thritis** – chronic (long-lasting) inflammation of the joints. ↓ corticosterone.

/-rhexis = ↓ /-rrhexia.

rhin-/ (rain-) – of the nose, e.g. **rhi'nitis** – inflammation of the inner membranes of the nose = "cold" in the nose. **'rhino'phyma** (-'faimə) – overgrowth and coarsening of the skin of the nose.

'rhinestone ('rainstoun) – imitation diamond.

rhiz-/-o-/ – root. **'rhizome** ('raizoum) – a thick horizontal stem just below the ground which puts out new roots and new stems above ground, e.g. in couch grass. **'rhizoid**



RHIZOMES

– root-like part of a fungus or moss.

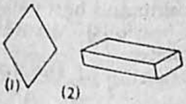
rhod-/-o-/ (roud-) — rose colour, e.g. **'rhodonite** – a rose-red coloured stone. **'Rhodo'phyta** – group of red ↓ algae which includes red seaweeds.

'rhodium ('roudiəm) – metal element similar to platinum, used in platinum-alloy, also in silver plating to prevent loss of colour (tarnish) due (e.g.) to city-air.

rho'dopsin (rɔ'dɔpsin) – a purple substance found in the rods (↓ rod-cells) of the retina (nerve-endings at the back of the eye). Seeing in weak light depends on rhodopsin; in strong light it is destroyed.

/-rhoea (-riiə) – ↓ /-rrhoea.

rhomb (rɔm) – (1) a **'rhombus** ('rɔmbəs) – a figure with four equal sides but whose angles are not necessarily right-angles; a diamond shape.

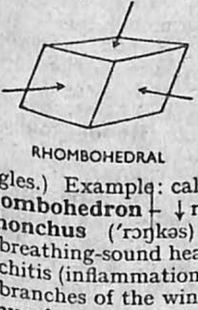


RHOMB

(2) a **'rhombo'hedron** – a solid figure with 6 faces each of which is (strictly) a rhombus or (more usually) a ↓ parallelogram.

'rhombic 'crystal system – ↓ orthorhombic.

'rhombo'hedral crystal system ('rɔmbo'hiidrəl) – A crystal of this shape can be turned about an axis (middle line) so that 3 times, in a whole turn, corners, edges and faces come into the same positions. (The crystal is based on 3 equal lines which cross at the same angles.) Example: calcite.



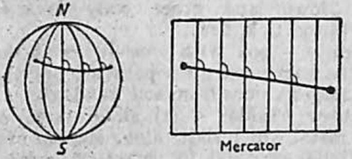
RHOMBOHEDRAL

rhombohedron – ↓ rhomb.

'rhonchus ('rɔŋkəs) – long rough breathing-sound heard (e.g.) in bronchitis (inflammation of the two lower branches of the wind pipe).

'rhumbatron – ↓ klystron.

rhumb line (rʌm) – line on a map (especially one showing a large part of the Earth) joining two places and crossing all the meridians (N. to S. lines) at the same angle. It is not the shortest path between the two places (unless they are both on the equator or a meridian) but it is used in steering (e.g. a ship) because the same compass direction is followed all the way. A rhumb line is straight on ↓ Mercator's projection.



RHUMB LINE

'rhynco-/ ('rinko-) – of the snout (nose and mouth of an animal), beak of a bird, e.g. **rhyncodont** – having a toothed beak.

'rhyolite ('raiolait) – glassy, igneous (heat-formed) rock, e.g. obsidian, formed from a flow of volcanic lava.

ria ('riiə) – valley which has been filled by the sea because of the slow sinking of the land (or rise of the sea).

rib – curved bone of the chest; curved beam; raised line on cloth.

'ribo'flavine ('raibo'fleivin) – part of ↓ vitamin B, a colouring matter of plants; found also in milk, yeast, liver, kidney, egg-white. It helps growth; absence causes reddening and soreness of the lips, redness at the edge of the ↓ cornea, loss of energy.

'ribonu'cleic acid (R.N.A.) ('raibou-nju'klei.ik -) – one of the ↓ nucleic acids; a complicated substance found in both the nuclei and the surrounding protoplasm of living cells. It plays an important part in the forming of proteins. Also see desoxyribonucleic acid.

'rickets ('rikits) – softening of the bones in childhood due to lack of vitamin D. Vitamin D is a substance obtained from fresh food (e.g. milk, butter) and also produced in the body with the help of sunlight;

without vitamin D the body cannot absorb calcium (lime) from the food so as to build the bones.

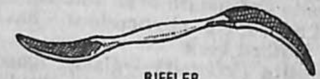
Ri'ckettsia (ri'ketsiə) – organisms (in size between bacteria and virus) which cause typhus, spotted fever, and other diseases; carried by the ↓louse and other body-parasites (mite, tick, flea).

riddle – box with cross-wires at the bottom used for separating out the larger stones from soil, sand, etc.

'rider ('raidə) – (1) small piece of metal which slides along the bar of a balance (used for exact weighing); (2) proof in geometry which follows very easily from another proof.

'ridging – giving a high wave-like surface to a field so that the greatest possible area may be broken up by cold in winter.

'riffler ('riflə) – curved file (tool) for shaping concave (in-curved) surfaces.



RIFFLER

'rifling ('raifliŋ) – spiral grooves inside the barrel of a gun.

right a'scension (-ə'senʃən) – the distance of a star east of a line through a fixed point in the sky (called the First Point in Aries). The distance is stated as an angle, or as hours, minutes, seconds. Compare longitude of a place on the Earth. For a diagram see declination.

right-hand rule – ↓Fleming.

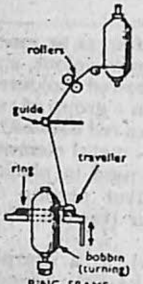
'rigid ('ridʒid) – which cannot be bent or pushed out of shape. **'rigor** ('raigɔɔ) – stiffness and shivering (shaking) as at the height of a fever. **rigor mortis** – stiffness of the body after death.

'rima ('raimə) – a crack. **'rimose,** adj.

'rimer – = ↓reamer.

'rinderpest ('rindəpest) – disease of cattle, sheep, goats (not horses, pigs) due to a ↓virus; it causes death within 4–5 days.

ring (chemical) – arrangement of atoms of a molecule as in ↓benzene, ↓pyridine, etc., not in line as in alcohol.



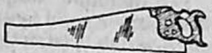
RING FRAME

ring-frame – cotton-spinning machine in which the thread is drawn out, twisted and wound on a bobbin (see picture). The bobbin turns inside the "ring"; the thread passes through the "traveller" on the edge of the ring. As the bobbin turns, the traveller is dragged round the ring. The ring moves up and down so that the thread is wound evenly. ↓fly-spinning.

RING-WORM

'ring-worm – disease of the surface of the skin and hair caused by (various) vegetable parasites.

ri'parian (rai'peəriən) – of the river bank.



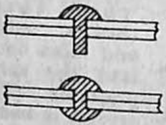
RIP-SAW

'rip-saw – tool for cutting wood along the grain (in the direction of the fibres).

'riser ('raizə) – the upright part of a step, e.g. in a staircase.

'risus sar'donicus ('raisəs saa'dɔnikəs) – drawing back of the lips as in a smile, e.g. in poisoning by a substance which causes uncontrolled contraction of the muscles, e.g. strychnine poisoning.

'rivet (rivit) – form of nail for permanently fastening two sheets (e.g. of metal) together. It is put through a hole in the sheets and then its thin end hammered flat.



RIVET

'Robot ('roubɔt) – name of a machine man in a play (machine which looked like and worked like a man); so **robot pilot** – instrument which keeps an aeroplane on its course without help from the pilot. **robot furnace** – machine which puts coal on a furnace when needed.

Ro'chelle salt (rɔ'ʃel) – sodium potassium tartrate; used in medicines for the bowels (e.g. Seidlitz powder): also in ↓piezo-electricity: $C_4H_4O_6NaK.4H_2O$.

'rocket pro'pulsion – form of ↓jet propulsion in which the oxygen (or other agent for burning the fuel) is carried in the machine.

'Rockwell hardness test ('rɔkwel -) – test of hardness of a substance; made by driving a small steel ball or specially shaped diamond point into the substance with a certain force; the depth to which the penetrator (ball, etc.) goes in tells the hardness.

ro'coco (ro'kouko) – excessively complicated decorations in a building.

rod – (1) 306 cubic feet of brickwork; (2) long measure, 5½ yards.

'rod-cell – nerve cell of eye which is active in weak light; ↓rhodopsin: in strong light the ↓cones (cone-shaped nerve-endings) are active and the rods are inactive.

rod-/ (roud) – to gnaw, to cut away with the teeth, e.g. **'rodents, Rod'entia** – animals which have chisel-like teeth suitable for gnawing, e.g. rats, mice, rabbits. **'rodent ulcer** – a sore place on the skin which eats away the skin round it; compare ↓cancer.

rogue (roug) – a plant which is different from the usual form of such plants, ↓mutation. **rogue potato** – potato growing up among other plants, from a potato left in the ground last year.

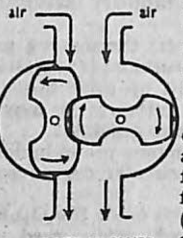
'Romberg's sign ('rɔmbəəgz -) – not being able to stand steady when the eyes are shut, a sign of nervous disease.

'Röntgen rays ('rəəntgən -) = ↓X-rays.

rood – measure of area, ¼ acre (= 1,210 square yards).

root – e.g. **square root** (of a number) – a number such that when it is multiplied by itself the result is the given number, e.g. the square root of 9 is 3 or −3. **cube root** – a number such that when it is twice multiplied by itself the result is the given number, e.g. the cube root of 27 is 3 because 3 × 3 × 3 = 27. **root mean square** – measure of the average value of an alternating current, etc.; an alternating current of 2 amperes R.M.S. has the same heating power as a direct current of 2 amperes, but it varies between ⊕ 2·82 and ⊖ 2·82. The R.M.S. value = peak (greatest) value divided by $\sqrt{2}$. So also a house supply of 200 volts (R.M.S.) varies between ⊕ 282 and ⊖ 282 volts.

'Roots blower – instrument as shown, used for producing a flow of air, used (e.g.) in superchargers (for putting air + petrol under pressure into a motor-car or aeroplane engine).



ROOTS BLOWER

roots of an equation – the values of x which make the equation true, e.g. 3 and 1 are the roots of the equation, $x^2 - 4x + 3 = 0$.

ropy ('roupi) – ropy flour = flour attacked by the *Bacillus 'mesen'tericus* causing string-like masses. **ropy paint** – paintwork showing lines of brush marks.

'Rorschach test ('rɔɔʃæk -) – test of character and emotional tendencies made by studying the mind of the person by means of a set of ink-blots (shapes as made by ink dropped on to paper): the person is asked to say what idea is brought to mind by each shape.

RORSCHACH TEST

ro'sacea (rou'zeiʃiə) – ↓acne.

Ro'saceae (-si.ii) – family of plants including rose, cherry, strawberry, etc.

'Rose'ola ('rouzi'oulə) – any rose (pink) coloured rash (redness of the skin).

'rosin ('rɔzin) – ↓resin.

'rostral ('rɔstrəl) – (rostrum = beak of bird): adj. pointed, e.g. the rostral end of the finger.

'rotary ('routəri) – which **rotates** (turns round), e.g. rotary printing machine – which prints from a curved, rotating metal plate.

Ro'tifera (rou'tiferə) – very small water organisms (of over 800 kinds) having two rings of cilia (thread-like outgrowths) round the mouth.

'Roto'dyne ('routə'dain) – an aircraft which can rise very steeply by means of rotating wings and then fly forwards like an ordinary aeroplane. (Trade name.)

'rotor ('routə) – (1) the moving part of a ↓ reaction turbine; (2) revolving blades which lift up some forms of aircraft, e.g. ↓ autogiro; (3) moving part of an electric generator.

ro'tunda (rou'tʌndə) – round building with a dome (circular curved roof) over it.

rouge (ruuʒ) – iron oxide (Fe_2O_3) in a finely powdered state used for polishing.

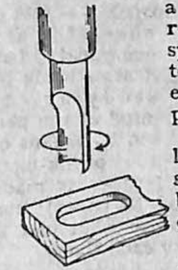
'roughage ('rʌfidʒ) – woody material not digested but useful in causing action of the bowels, e.g. the fibre of cabbage, of brown bread, of boiled oatmeal (porridge).

rou'lette (ruu'let) – path marked out by a point on one curve which rolls on another curve. ↓ cycloid.

'router ('rautə) – tool used for cutting away the bottom of a groove in wood. **routing machine** – spinning point used to cut away metal, e.g. from a printer's picture-plate.

roving ('rouviŋ) – last and smallest strip of cotton-wool before it is spun into cotton thread.

/-rrhaphy (-rəfi) – sewing up a wound, e.g. **'perine'orrhaphy** ('perinii'ɔrəfi) – sewing up a tear in the ↓ perineum (e.g. after difficult birth of a big baby).



ROUTER

/-'rrhexia ('reksiə) – breaking up, e.g. **'karyo'rrhexia** – breaking up of the nucleus of a cell. **/-rrhexis** – bursting, e.g. **'hepato'rrhexis** – bursting of the liver (e.g. in a car-accident).

/-rrhoea (-riiə) – flow of substance from the body, e.g. **'dia'rrhoea** ('daiə'riiə) – flow from the bowels. **'rhino'rrhoea** ('raino'riiə) – flow of liquid from the nose.

rube-/ (ruubi-) – red, e.g. **'rube'facient** ('ruubi'feisiənt) – causing redness of the skin, e.g. a hot mustard plaster put on the skin.

ru'bella (ruu'belə) – German measles, a mild (not serious) infectious disease of children, causing a rash (redness) on the face, neck, body.

ruby light – dark red light, a "safe-light" for use when developing ↓ orthochromatic films.

ru'daceous rocks (ru'deiʃiəs) – rocks made up of large pieces of broken material.

'rudi'mentary ('ruudi'mentəri) – not fully developed, e.g. the tail bones and their muscles in man.

ruf-/ (ruuf) – e.g. **'rufous, ru'fescent** – red-brown.

rule – (1) measuring bar, e.g. foot-rule; (2) piece of printer's type with a line on it, e.g. – or — or ——.

'rumen ('ruumen) – first stomach of a cow from which food is brought back into the mouth. **'ruminants** – animals which have such an organ: for diagram see abomasum.

running-in an engine – running an engine slowly (and gradually faster) for some time so that its parts may wear to a perfect fit.

'runway – hard road from which an aeroplane starts off.

'rupture ('rʌptʃə) – (1) breaking or tearing of a muscle; bursting of a blood-vessel; (2) ↓ hernia.

rust fungi – parasitic fungi whose spores form red (rust-like) marks on wheat and other plants. Part of the life of the fungus is spent on the barberry plant. Another kind of rust attacks white pines and spends part of its life on gooseberry and currant bushes.

rut (rʌt) – period of sexual excitement in a male animal.

'rutile ('ruutail) – red crystalline ↓ titanium oxide (TiO_2); titanium ore. Yellow-white crystals form precious stones, nearly as bright as a diamond but less hard. Artificial rutile stones are made.

S

S – chemical sign for ↓sulphur.

Σ – Greek letter sigma ('sigmə); – "add together," "sum of", e.g. if x = number of men working on each day (Monday, Tuesday, etc.), y = number of hours worked each day, Σxy means "multiply together number of men by number of hours, for each day, and add together all the answers".

∫ – sign used in integral ↓calculus to mean the adding up of a great number of terms (quantities) which can be made as small as we please.

S.D. – ↓standard deviation.

S.G. – ↓specific gravity.

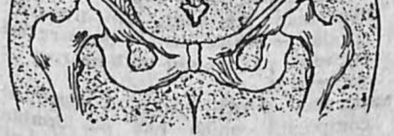
s.t.p. – at standard (usual, as agreed) temperature and pressure. ↓N.T.P.

sac (sæk) – a bag-like part or organ of the body.

'sacchar-/ ('sækə-) – sweet. **'saccharin, 'saxin** – a very sweet white powder prepared from ↓toluene, used instead of sugar. **'saccha'rimetry** – measurement of the amount of sugar in a solution (especially by measurement of the twisting of ↓polarized light). **'saccharo'myces** (-maisiis) – yeasts which ferment sugar and produce alcohol.

'saccule, 'sacculus – a small ↓sac.

'sacral ('seikral) – of the **sacrum** = the part of the pelvis (ring of bones at the base of the body) where the spine joins.



SACRAL

'sadism ('seidizm) – a form of mental disorder which shows itself in taking pleasure in causing pain to others.

safety factor – extra strength given to a bridge (aeroplane, etc.) beyond that needed for the greatest expected load.

safety-lamp – lamp used by miners; the flame inside its woven wire container does not set fire to any gas in the mine; for picture see Davy lamp.

safety-valve – valve with a spring or weight which lets out steam when the pressure in a boiler becomes too great.

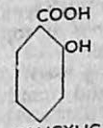
'sagitt-/- ('sædʒit-) – arrow. **'sagittate** – arrow-shaped. **'sagittal** (line) – direction of a part of the body running from front to back, e.g. the middle line of the skull from front to back.

Saint Elmo's fire (snt'elmouz) – electric *discharge seen at the top of a high point (e.g. ship's mast) in stormy weather: *(flow of electricity through a gas, usually as a spark or flame).

Saint 'Vitus' dance (snt'vaitəs) – ↓chorea.

sal – salt. **sal a'mmoniac** ('sælə'mouniæk) – ammonium chloride (NH_4Cl), used, e.g., in electric dry batteries. **sal vo'latile** ('sælvə'lætəli) – ammonium carbonate + oil of lemon (and other such oils) + alcohol: breathed in, or taken in water as a general stimulant (= medicine used to overcome a feeling of faintness).

salic-/ ('sælis-) – (of the) willow tree. **'sali'cylic acid** – substance from which aspirin (etc.) is made.



SALICYLIC

'salient angle ('seiliənt-) – angle standing outwards, e.g. from a wall. ↓re-entrant.

'saline ('seilain) – salt. **salines** – "salts" used to cause action of the bowels.

sa'liva (sə'laivə) – the liquid of the mouth.

'Salmo'nella ('sæmə'nelə) – the group of bacteria which causes ↓typhoid and ↓paratyphoid fever, also food-poisoning.

'salping-/ ('sælpindʒ-) – like a

trumpet: having to do with the trumpet-shaped opening of the Fallopian tube into which the ovum (female cell) passes when it leaves the ↓ovary; e.g. **'salpin'gitis** – inflammation of the Fallopian tubes.

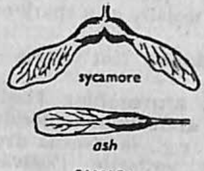
salt (sɔlt) – substance produced when a metal (or group of atoms which acts like a metal) takes the place of one or more hydrogen atoms in an acid, e.g. sulphuric acid H_2SO_4; sodium sulphate, Na_2SO_4; copper sulphate, $CuSO_4$.

saltat-/ (sælteit-) – jumping, e.g. **sal'tatory,** e.g. saltatory legs of a grasshopper.

salt'petre (sɔlt'piitə) – ↓potassium nitrate.

'Salvar'san ('sælvə'sæn) – trade name for an arsenical drug used to cure ↓syphilis; also called 606 (six o six).

'samara ('sæmərə) – seed with a wing, e.g. of the Ash tree.



SAMARA

'sand-blasting – cleaning metal by blowing sand against it with great force; used also to give a rough surface to glass.

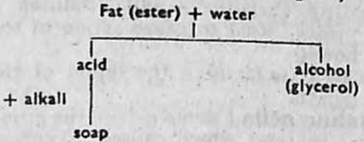
sand'fly – small insect (*Phle'botomus papa'tasii*) which causes sandfly fever (a fever lasting 3 days).

sangui-/-n-/ – blood, e.g. **san'guineous** – of blood, full-blooded, blood-coloured.

'sans'serif ('sæn'serif) – printers' type without the little cross lines at top and bottom, as here printed.

'santonin ('sæntonin) – drug used to drive out small (thread- and round- but not tape-) worms from the bowel.

sapo-, sapon-/ (seipou-, sæpɔn-) – soap. **sa'ponifi'cation** – the chemical process in making soap. A fat is an ester; an ester is a compound of an acid and an alcohol. Fat, when treated with water, becomes glycerol and an acid. With an alkali (e.g. caustic soda) the salt of the acid is formed; this is soap. The word saponification is also used for the breaking up of any ester into acid (or salt) and alcohol.



SAPONIFICATION

sapr-/-o-/ (sæpro-) – rotten, decayed. **'saprobi'otic** – living in decayed matter. **'sapro'phytes** – plants which live on dead or decaying matter, e.g. some kinds of fungi, also bacteria which break up dead vegetable matter.

sarc-/-o-/ – flesh. **sar'coma** (saa'koumə) – a diseased growth (↓cancer) in the muscles and ↓connective tissues.

'Sarco'dina ('saako'dainə) – very small one-cell animals (e.g. amoeba) which are able to push out projections (↓pseudopodia) of their protoplasm.

sar'coptes (saa'kɔptiiz) – the small creatures which cause ↓scabies: ↓acarus scabiei.

sar'torius muscle (saa'tɔɔriəs -) – the very long muscle at the back of the upper part of the leg – the longest muscle in the body.

sa'teen (sæ'tiin) – cotton cloth with a very smooth shiny surface made by carrying the warp (cross thread) over about 4 (out of every 5) long threads. **satin** – the same, but made of silk.

'satellite ('sætelait) – (1) a natural "moon", such as that of the Earth, which goes round and round a planet. (2) an artificial "moon", carrying instruments or passengers, sent up by scientists.

'saturated air ('sætjuəreitid) – air with as much water vapour in it as it can hold (at that temperature): ↓relative humidity. **saturated colour** – pure colour with no grey or white in it.

saturated compound – a chemical compound which has no double bonds. Thus CH_4 is saturated, but ethylene ($CH_2{=}CH_2$) is unsaturated. Further atoms cannot be added to a saturated molecule; ↓unsaturated.

saturated solution – a solution (e.g.

of salt in water) which contains so much of the dissolved substance that no more can be dissolved at that temperature.

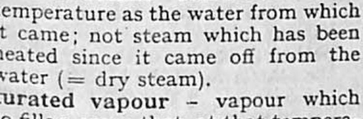
saturated steam – steam at the same temperature as the water from which it came; not steam which has been heated since it came off from the water (= dry steam).

saturated vapour – vapour which so fills a space that, at that temperature, no more liquid will evaporate into it.

'satu'ration 'current – current which flows in a radio valve when the electrons (negative particles) are pulled to the anode (positive plate) as fast as they are set free at the cathode (negative plate). Bigger anode pressure (voltage) causes no increase in current.

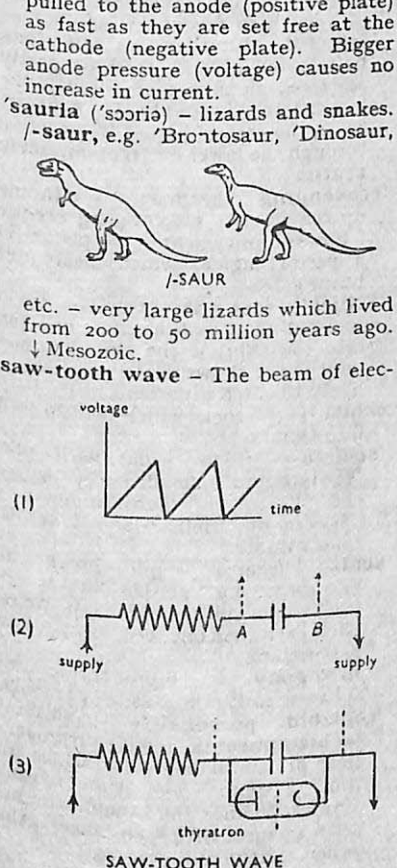
'sauria ('sɔɔriə) – lizards and snakes.

/-saur, e.g. 'Brontosaur, 'Dinosaur, etc. – very large lizards which lived from 200 to 50 million years ago. ↓ Mesozoic.



/-SAUR

saw-tooth wave – The beam of electrons in a television instrument is moved across the screen by a magnetic field on each side. It moves steadily across from left to right making one line of picture; then flies very quickly back (not making picture on the way). To produce this movement we need a steadily increasing pressure of electricity, up to a point; then a sudden let-go: (see diagram 1). Such a wave of electricity is called a saw-tooth wave. The increasing pressure is produced across the ends *A*, *B* of a condenser joined through a resistor to an electric supply: (see diagram 2). A ↓ thyratron (joined across the condenser) suddenly "lets go" (discharges) the pressure when it reaches a certain strength: (see diagram 3). Other methods may be used.



SAW-TOOTH WAVE

saxin – ↓ saccharin.

Sb – chemical sign for stibium = antimony.

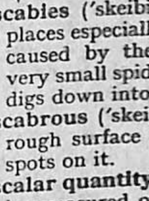
scab – (1) cap of dried blood and body liquids on the top of a wound; (2) disease of animals similar to ↓ scabies.

'scabies ('skeibiiz) – rough irritating places especially between the fingers, caused by the ↓ *Acarus scabiei* (a very small spider-like creature which digs down into the skin).

'scabrous ('skeibrəs) – having a very rough surface with raised points or spots on it.

'scalar quantity – quantity which can be measured on a scale; it has size, but not direction. Temperature is a scalar quantity. Force is not a scalar quantity because to describe it we must say its size *and* its direction. ↓ vector.

scale effect – difference of behaviour of a full-size object (e.g. aeroplane) from that of a small model made for testing. ↓ Reynold's number.



SCALENE TRIANGLE

sca'lene triangle (skei'liin -) – triangle with all its sides and angles unequal.

'scalloped ('skæləpd) – having its edge made of half circles (like a scallop shell, see next page).

scallop shell

SCALLOPED

scalp (skælp) – the five layers covering the head: – (1) hair + skin; (2) fat; (3) membrane; (4) tissue which moves over (5) the pericranium (layer fixed down to the bone of the head). The word is loosely used to mean only layer 1, or layers 1–4.

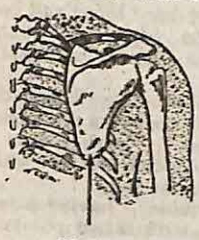
'scalpel ('skælpəl) – surgical knife.

SCALPEL

'scanner – – instrument used to send out a revolving ↓ Radar beam.

'scanning – the passing of a beam of electrons across and across the picture in an instrument (e.g. ↓ Iconoscope) used for sending out television; and as in a television receiver. ↓ interlaced, saw-tooth.

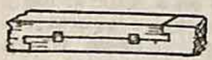
scantlings – (1) various not very thick pieces of wood; (2) the waste material left after cutting up a log; (3) pieces of stone over 6 feet long.



SCAPULA

scaph-/- (skæf-) – boat, shaped like a boat; e.g. **'Scapho'poda** – a class of shellfish.

'scapula ('skæpjulə) – the shoulder blade.



SCARF JOINT

'scarf joint (skaaf) – joint for joining wood end to end, e.g. as shown; also called table joint.

'scarify ('skærifai) – make many small cuts or scratches in the skin. **'scarifier** – machine for breaking up the surface of a field or of a road.

'scarla'tina, scarlet fever ('skaalə'tiinə) – infectious disease, mostly of children, which causes high fever, sore throat, redness of the skin, except round the nose and mouth. The tongue is white at first, then very red. The disease may lead on to inflammation of the kidneys. It is caused by a haemolytic (which breaks up the blood-cells) ↓ streptococcus.

scarp (skaap) = ↓ escarpment.

scattering – When wave radiations or atomic particles pass through matter they may be scattered, i.e. turned in various directions from their original paths. (The blue of the sky is due to the scattering of the blue light in the atmosphere; ↓ Tyndall.) In **elastic scattering** the radiations are unchanged; in **inelastic scattering** they lose energy.

scatter propagation – Radio waves can be received from a transmitter below the horizon because they are reflected by the ↓ ionosphere. Waves of very high frequency are not so reflected. But they can sometimes be received because they are partly scattered as they pass through the ionosphere (**ionospheric scatter**) or, in the case of higher frequencies, through the lower air (**tropospheric scatter**).

'scavenging ('skævindʒiŋ) – cleaning up the streets. **scavenging stroke** – upward movement of the piston (in a petrol engine) which clears out burnt gases.

'Schick's test (ʃiks -) – the toxin (poison) of ↓ diphtheria is injected into the skin; if the skin becomes very red it shows that the person is likely to catch diphtheria.

schist (ʃist) – rocks which tend to split into thin layers.

'schisto-/- ('ʃisto-) – flat, as if split. **'schistocyte** – small, badly shaped red blood cell. **'schisto'soma** – parasite of ↓ bilharzia = **'schistoso'miasis.**

schizo-/ (skaizo-) – split, break into two parts, e.g. **'schizo'carp** – dry fruit which splits into two (or more) parts each with one seed, e.g. mallow, nasturtium.

schi'zogony – reproduction by splitting in two, e.g. as in ↓ amoeba.

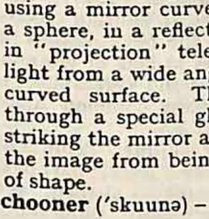
'schizoid personality ('skaizɔid), **'schizo'phrenia** ('skidzo'friiniə) – form of mental disorder in which the mind "splits" and the person's actions, feelings and thoughts do not seem to agree with each other. (Also called ↓ dementia praecox.)

'schizont ('skaizɔnt) – single-cell organism ready to divide into two, e.g. malaria organisms in the blood cells of man.

'Schlieren photography ('ʃliiərən) – method of photographing waves in the air caused, e.g., by the flight of a bullet, or explosive pulse coming out of a gun. Changes in air density produce changes in refraction (bending) of light; the photograph is made by the light, from an electric spark, which passes through the wave.

Schmidt optics (ʃmit -) – method of using a mirror curved like a part of a sphere, in a reflecting telescope or in "projection" television, to focus light from a wide angle on to a small curved surface. The light passes through a special glass plate before striking the mirror and this prevents the image from being blurred or out of shape.

'schooner ('skuunə) – sailing ship with 2 masts: the aft (further back) mast is higher than the front mast. There are also 3, 4, 5 and 6 mast schooners; these have masts of the same height (except the mast furthest back); the sails are fore and aft (longways).



SCHOONER

'Schwann, sheath of (ʃwɔn) – ↓neurolemma.

scia-/, scio-/ (skaiə-, skaio-) – shadow. **'sciagram, skiagram** – ↓X-ray photograph. **'sciagraph, sciograph** – a drawing showing the inside of a house as if the house were cut through vertically.

sci'atic nerve (sai'ætik) – nerve running down the back of the upper part of the leg. **sci'atica** – pain in the sciatic nerve.

'scintillate ('sintileit) – give an unsteady bright light, as of a star or a well-cut jewel.

scio-/ – ↓**scia-/.**

'scion ('saiən) – part of a plant grafted on to (made to grow in the stem of) another plant.

'scirrhus ('skirəs) – hard, diseased growth (↓cancer) in which there is much fibrous tissue.

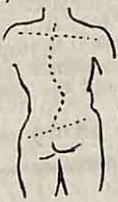
'scissile ('sisail) – which can be split.

'scleren'chyma ('skleren'kaimə) – hard woody layers of cells which help to support or protect softer parts (e.g. stems) of a plant.

sclero-/ (sklero-) – hard. **'sclero'derma** – disease which causes the skin to become hard like leather. **scle'rosis** – hardening of tissue, e.g. **disseminated sclerosis** – disease which causes hard areas to appear in the spinal cord and the brain, causing loss of power in, or control over the muscles. **scle'rotic coat** – hard outside layer of the eyeball.

sc'leroscope (sk'lerəskoup) – instrument for measuring hardness; a weight with a diamond tip is dropped from a certain height; hardness is measured by the distance the weight bounces upwards.

scol-/ (skoul-) – (1) thorn, hollow pointed thing, e.g. **'scolus** – thornlike outgrowth on insect larva. **'scolopale, 'scolophore** – thorn-shaped hearing-nerve of an insect; (2) bent, crooked, e.g. **'scoli'osis** ('skouli'ousis) – twisting of the spine to one side



SCOLIOSIS

/-scope (-skoup) – instrument for seeing, e.g. **'spectroscope** – instrument for viewing a spectrum; **'periscope** – instrument for looking round (*peri-*) a corner; **e'lectroscope** – instrument for showing the presence of an electric charge.

sco'polamine (skɔ'pɔləmiin) – = hyoscine, a drug which helps to lessen the pain of childbirth as in "Twilight sleep" (process of painless childbirth); used also to prevent seasickness, and to lessen excitement in disorder of the mind.

scor'butic (skɔɔ'bjuutik) – of ↓scurvy.

'scoria ('skɔriə) – ashes of a volcano; waste substance left after ↓scorifying.

'scorify ('skɔrifai) – separate gold and silver from ore by treating with lead and ↓borax.

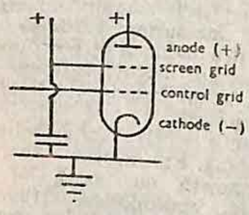
sco'toma (skɔ'toumə) – disorder of the eye which causes loss of sight in a certain area, e.g. at the edge or in the middle.

'scouring ('skauəriŋ) – washing away, e.g. washing away of soil or rock by rapidly flowing water; washing oil and fat from finished cloth.

scree – mass of pieces of fallen rock at the foot of a mountain.

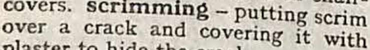
screen – (printing) a network of lines used in reproducing pictures by ↓half-tone; a large box with a crossed-wire bottom for separating earth and stones.

screen grid (in a tetrode = radio valve with 4 electrodes) – the grid consisting of a fine net of wires, between the usual (control) grid and the anode (⊕ plate). It is usually made electrically positive and joined to Earth by a condenser. Its purpose is to stop (or make small) any condenser effect between the anode and the control grid.



SCREEN GRID

'scriber ('skraibə) – pointed metal tool for scratching lines on metal or wood to show where it is to be cut.



SCRIBER

scrim – thin, loosely woven canvas, used in book-binding, and as an inside lining in clothes and in chair-covers. **scrimming** – putting scrim over a crack and covering it with plaster to hide the crack.

script type – printer's type as shown.

'scrofula ('skrɔfjulə) – ↓tuberculous disease of the glands of the neck.

'scrotum ('skroutəm) – the bag which contains the testes (two parts of male reproductive organ).

'scrubbers ('skrʌbəz) – instruments in coal-gas manufactory in which the gas is cooled and washed to get out tar, ammonia and sulphur compounds.

'scruple – unit measure of weight, = 20 grains = 1·3 grammes.

'scuppers ('skʌpəz) – U-shaped waterways running the full length of a deck of a ship on each side, with holes to let the water run into the sea.

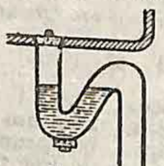
scurf (skəəf) – small dry plates (scales) of skin among the hairs of the head.

'scurvy, scor'butus ('skəəvi, skɔɔ-'bjuutəs) – disease causing blood to flow out from the blood-vessels into the tissues, due to lack of vitamin C (as in fresh fruit and vegetables); the disease was once common among seamen.

scut-/, 'scutum (skjuut-, 'skjuutəm) – plate curved like a shield; part of the body of an insect so shaped. **scu'tellum** (skjuu'teləm) – thing shaped like a small shield, e.g. the scutellum of wheat grain – part by which the embryo (young plant inside a seed) gets the food which is inside the seed.

scyph-/ – ("drinking cup"): e.g. **'Scypho'zoa** ('skaifo'zouə) – a large class of jelly-fishes; so named because of the cup-like shape.

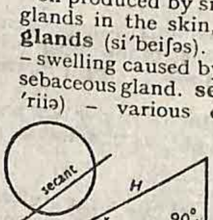
seal (siil) (building) – water in a U-shaped pipe (↓trap) which prevents back-flow of gas and smell from drains, e.g. below a hand-washing basin, or lavatory-pan.



SEAL

'sebum ('siibəm) – oil produced by small oil-producing glands in the skin, the **se'baceous glands** (si'beiʃəs). **sebaceous cyst** – swelling caused by stopping up of a sebaceous gland. **seborrhoea** ('sebə'riiə) – various disorders of the sebaceous glands, e.g. excessive production of oil.

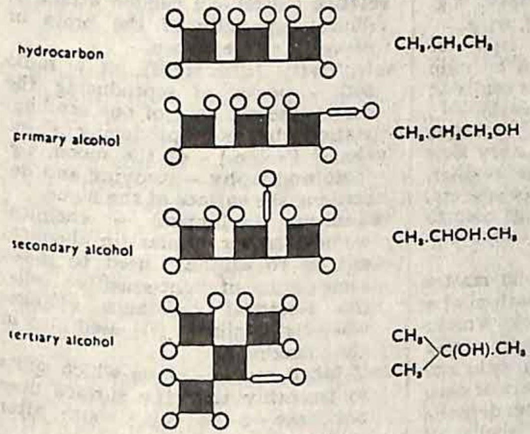
'secant ('siikənt) – (1) a line passing through a circle and so cutting off part



SECANT

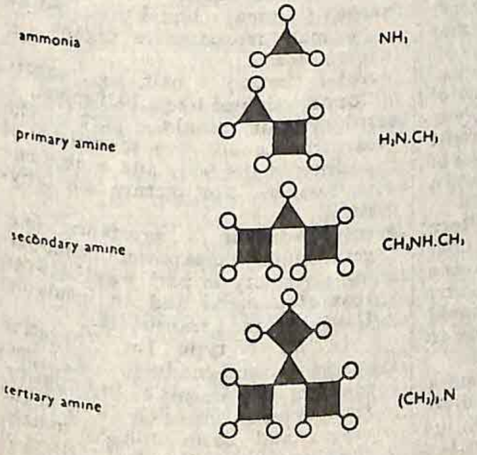
of the circumference; (2) (of an angle x). Hypotenuse (line opposite right angle) ÷ Base, i.e. $\frac{H}{B}$. Written shortly as *sec* x.

'secondary 'alcohol – an alcohol with the –OH group joined to a middle carbon atom in a chain, making the group –CHOH. (A tertiary alcohol has the group –C.OH.)



SECONDARY ALCOHOL

'secondary 'amines – The ammonia molecule is NH_3. If in place of 1, 2, or 3 H atoms we put 1, 2 or 3 hydrocarbon groups (e.g. CH_3), we have a primary, secondary or tertiary amine. (The $-NH_2$ group of a primary amine is an amino-group; the $=NH$ group of a secondary amine is an imino-group.)



SECONDARY AMINE

secondary cell – the electric-storage battery (e.g.) of a car is a set of secondary cells: the cell can be recharged by passing a current through it. ↓ primary.

secondary coil – the winding of a ↓ transformer from which power is taken out.

'secondary depression – a small area of low pressure on the edge of a large (primary) area of low pressure.

'secondary e'mission (of e'lectrons) – sending out of other electrons by a metal plate when a stream of electrons hits the plate.

secondary thickening (growth) – making of new cells (e.g. wood) by the ↓ cambium in a branch or trunk of a tree.

second of an arc – ↓ arc.

se'cretin (si'kriitin) – substance produced in the upper part of the bowel when food enters the bowel; secretin is carried by the blood to the ↓ pancreas and causes it to pour into the bowel substances necessary for digestion: it also causes a flow of bile (yellow-green liquid produced by the liver which helps digestion of fats).

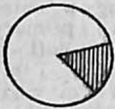
sec'retion (si'kriiʃən) – a substance produced by a gland, e.g. the liver secretes bile; the process of secreting. (Compare **excretion** = matter passed out from the body, e.g. urine, sweat.)

/-sect – cut, e.g. **bisect** – to cut into two (usually equal) parts.

'section ('sekʃən) – a cutting; a very thin piece of a plant (or piece of body-tissue, etc.) prepared for the microscope. ↓ cross-section. /**-section** – cutting, e.g. **'resection** – cutting away a (diseased) part of a bone. **'vivisection** – cutting living animals for scientific study.

'sectional ('sekʃənəl) – made in pieces which can be put together, e.g. sectional book-case, bridge, map.

'sector ('sektə) – part of a circle (or ellipse) cut off by radii (lines from the centre to the circumference).



SECTOR

'secular changes ('sekjulə -) – very slow changes in the weather, in the depth of sea, etc.

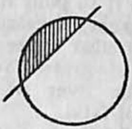
'sedatives ('sedətivz) – drugs used to produce quietness and calm, e.g. potassium bromide.

'sediment ('sedimənt) – solid matter which goes down to the bottom of a liquid. **sedi'mentary rocks** – rocks formed from material worn away (e.g. by rivers) from earlier rocks and deposited (e.g.) on the floors of seas, etc. Also rocks formed from deposits of the hard parts (e.g. shells) of organisms or from material (e.g. salt) set free from a solution.

'Seebeck effect – ↓ thermo-electric effect.

'Seger cones ('siigə 'kounz) – cones which melt and bend over when a furnace (e.g. used for pottery) reaches a certain temperature; also called ↓ pyrometric cones.

'segment ('segmənt) – a piece, e.g. one of the divisions of a jointed animal (e.g. Earthworm). **segment of a circle** – a piece of a circle cut off by a straight line.



SEGMENT

'Seidlitz powders ('sedlits -) – sodium bicarbonate + Rochelle salt in one packet, tartaric acid in the other; when mixed with water the liquid bubbles and gives off gas; drunk to cause action of the bowels.

seine (sein) – long net pulled round a certain area to catch all the fish in it.

'seismograph ('saizməgraaf) – instrument used to show earthquakes (movements of the surface of the Earth). The needle of the instrument draws a wavy line showing each pressure wave.

seize (siiz) – Part of an engine (e.g. a bearing) seizes when it gets so hot and expands so much that it sticks on to another part.

'seizure ('siiʒə) – a sudden attack of illness, especially of the brain or nerves, e.g. ↓ epilepsy.

selec'tivity (silek'tiviti) (of a radio set) – power of reproducing the music, speech, etc., of one sending-station while not reproducing others.

'selen-/ ('seliin-) – of the moon, e.g. **'sele'nography** – studying and describing the surface of the moon.

se'lenium (se'liiniəm) – chemical element rather similar (in chemical effects) to sulphur; used to make some kinds of light-sensitive cells: (its electrical resistance changes when light falls on it); used also in glass making.

self-faced stone – stone which splits so smoothly that the surface does not have to be cut smooth after splitting.

self-in'ductance – When a varying current passes through a coil, a pressure (voltage) is produced which opposes (acts against) the change. This effect is self-induction; the coil has self-inductance.

'semen ('siimen) – liquid produced by the male reproductive organs. ↓ spermatozoa.

'semi-/ ('semi-) – half, e.g. **'semi-'lunar** – shaped like a half-moon.

semi'circular canals – part of the ear; the canals give sensations of position of the body and enable one to balance. For picture see labyrinth.

semi-conductor – substance (e.g. germanium) whose power of conducting electricity is part way between that of a metal and an insulator. Used, e.g., in ↓ transistors.

In an **N-type** (= "negative carrier") semi-conductor, e.g. germanium with arsenic as an impurity, there is an excess of electrons in the crystal and, as in ordinary metals, the electrons are the chief carriers of the electricity.

In a **P-type** (= "positive carrier") semi-conductor, e.g. germanium with indium as an impurity, there are too few electrons in the crystal, i.e. there are places (**"holes"**) where electrons "ought to be" but are not. These holes, because they lack negative electrons, act as if they were positive charges and it is the movement of the holes which (chiefly) forms the current.

'seminal ('seminəl) – of ↓ semen.

semi-water gas – mixture similar to ↓ water-gas (mainly hydrogen, carbon monoxide and air); used for burning, also for making ammonia.

sen-/ (siin-) – old age, e.g. **se'nescent** – growing very old. **'senile** ('siinail) – of old age, e.g. **senile decay.**

senna ('senə) – the leaves of the Cassia plant used as a drug to cause action of the bowels.

sense (radio) – In radio direction-finding, one first finds the line along which radio-waves are travelling, e.g. along a north–south line. In finding the sense one finds the **direction,** i.e. N → S or S → N.

sen'silla(-ae) (sen'silə, /-ii) – sense organ(s), e.g. feelers of insects.

sensitive flame – flame which changes its height or shape when sound waves fall on it.

'sensitize ('sensitaiz) – cause to be **sensitive** (-tiv) = able to be affected by –, e.g. photographic films are sensitive to light; they are **light-sensitive.**

'sensi'tometry – measurement of the sensitiveness of photographic films to light. ↓ H. & D.

'sensory ('sensəri) – having to do with sensation. **sensory nerve** – nerve carrying sensations (e.g. of touch, pain, hearing, taste, etc.) to the spinal cord and brain.

'sentiment – a group of ideas and emotions centred round some object, e.g. round God, one's country, one's family.

'sepals ('sepəlz) – green leaf-like parts (sometimes joined to form a calyx) underneath the petals of a flower. For a picture see stamen.

'separator – e.g. **cream separator;** – Milk is poured in at the top; it passes down through a number of spinning cups; the cream, being lighter, goes down through a hole in the bottom of each cup; the watery part of the milk is thrown off the edge of the cup and pours out of a different pipe from the cream.

SEPARATOR

'sepia ('siipiə) – red-brown, as in brown photographs; brown liquid sent out by some kinds of ↓ cuttle-fish.

cuttle fish
SEPIA

'sepsis ('sepsis) – poisoning of a part of the body by bacteria. **septic** wound – wound into which bacteria have entered, causing poisoning. **septicaemia** (-tis-) – blood-poisoning. **septic tank** – container in which sewage (town drainage) is purified by the action of bacteria. **antiseptic** – substance which destroys bacteria, e.g. carbolic acid, Dettol, etc.

sept-/ – seven.

'septate – ↓ septum.

'septic – ↓ sepsis.

'septum ('septəm) – a wall between one cavity and another, e.g. the wall in the centre between the two parts of the nose, wall across the thread-like tube (hypha) of a fungus. **septate** – with cross walls.

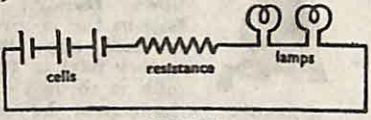
'sequelae ('siikwəlii) – the after-effects of a disease, e.g. weak heart after ↓ diphtheria.

se'questrum (si'kwestrəm) – a piece of bone which has died and seperated off from the living bone.

serge (səədʒ) – hard strong woollen cloth with slanting (diagonal) raised lines on it.

'series ('siəriiz) – set of things happening one after another; set of numbers each having the same relation to the one before it, e.g. 2, 4, 8: 2, 4, 6:

2, 6, 10, etc.: ↓progression. **in series** – way of joining electrical parts, end to end, so that the same current passes through all of them. Electric cells are in series if they are joined plus ⊕ to minus ⊖.



IN SERIES

'serif ('serif) – cross bar at top and bottom of a letter, e.g. d, p. ↓sans-serif.

se'rotonin (se'routənin) – substance (of unknown composition) found in the blood which causes blood-vessels to contract.

'serous ('siərəs) – watery, containing ↓serum. **'serous 'membranes** – smooth membranes whose surface is kept moist with liquid from the blood, e.g. the ↓peritoneum and the pleural membrane (surrounding the lungs).

serpentine – crystalline rock, often green with red markings, formed by *metamorphosis of coloured silicates (salts of silica): *(change caused by heat, pressure, etc., inside the Earth).

se'rrated (se'reitid) – having a toothed edge like a saw.

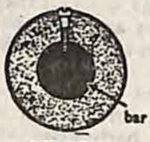
'serum ('siərəm) – (1) the clear yellow liquid of the blood (and ↓lymph); (2) serum (usually) from a horse which has had a certain disease and has produced antibodies (substances to act against the poison of the disease). The serum is injected into a sick person to help him to fight against the disease.

'servo-mechanism ('səəvou-) – apparatus for controlling a machine automatically. It measures what the machine is doing and makes the necessary corrections to keep the machine right. (An automatic pilot in an aeroplane contains a number of servo-mechanisms.)

'sesqui-/ ('seskwi) – one and a half. **sodium sesquicarbonate** – crystalline mixture of sodium carbonate and sodium bicarbonate ($Na_2CO_3.NaHCO_3.2H_2O$) used in wool-washing.

'sessile ('sesail) – ("sitting"): fixed, not moving, e.g. shell-fish fixed to a rock; (of a flower or leaf) having no stem.

'seta ('siitə) – stiff hair; hair-like outgrowth; stem of the spore-container of a moss.



SET SCREW

'set screw – screw used to prevent movement of (e.g.) a block on a bar.

set square – triangle of wood or metal used for drawing; the angles are 90°, 45°, 45°; or 90°, 60°, 30°.

SETT

sett – chisel used for cutting metal.

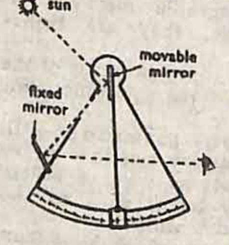
'setting – solidifying, e.g. **'setting-point** – temperature at which (e.g.) oil becomes solid.

setts – flat stones as on a road-surface.

sex-/ – six, e.g. **sexangular** – having six angles; *hex-/* is more usual.

'sex-linked character – a character which is carried in the same part of the reproductive cell (↓chromosomes) as male or female sex; e.g. in certain poultry the colour of the feathers is sex-linked so all males are a certain colour and all females a different colour.

sextant ('sekstənt) – instrument (measuring up to 120 degrees) used to measure angles, e.g. the angle of the sun above the horizon. The mirror is turned by an arm so that the image of the sun seems to lie on the horizon; the angle of the sun is shown on the scale at the bottom of the arm.



SEXTANT

shackle (ʃækl) – U-shaped round bar with a bar across it; the cross bar can (sometimes) be taken out; used e.g. to fix an anchor on to a chain.

SHACKLE

shadow - mask tube – ↓cathode-ray tube for colour television in which the electron beams are shot through holes in a metal screen (the shadow-mask) on to dots of powder which glow red, green or blue; the mask is arranged and the beams directed so that one beam falls only on red-glowing dots, one on green, and one on blue.

shaft (ʃaaft) – the main stem of a pillar; the hole straight down into a mine, e.g. to let air in; similar airway in a building: axle in an engine or machine.

shagreen (ʃæ'griin) – leather made from the skin covering the under part of a shark (large fish).

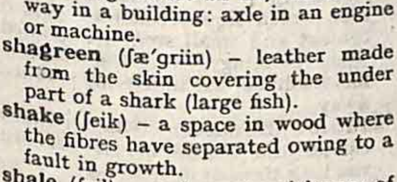
shake (ʃeik) – a space in wood where the fibres have separated owing to a fault in growth.

shale (ʃeil) – rock made of layers of hardened clay.

shank (ʃæŋk) – main stem of a pillar: part of the bar between the head and the handle of a tool (e.g. screwdriver).

sharp sand – sand having angular (not round) grains – as is necessary for cement.

shear (ʃiiə) – change of shape but not of size (diagram *A*); measured by the **angle of shear.** When a bar is twisted, each lengthway strip of it is sheared (diagram *B*).



SHEAR

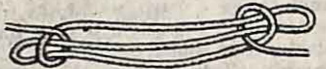
shear, to – cut as with scissors or **shears** (large scissors as used for gardening).

shear-legs – two poles tied together at the top, used as a movable crane, e.g. to lift heavy things out of a ship.

sheave (ʃiiv) – a pulley wheel; a pulley-wheel inside a block.

shed – the opening between the long threads (in a loom) through which the shuttle (carrying the cross thread) passes. **shedding** – lifting threads (as above) in weaving.

'sheepshank – knot, as shown, for shortening a rope.



SHEEPSHANK

shell (electronic) – the electrons in an atom are arranged in a series of shells round the nucleus. Those in the outer shells have more energy. Each shell may not contain more than a certain number of electrons (e.g. 2 in the innermost ↓K-shell). The number of electrons in the outside shell chiefly determines the chemical nature of the atom; e.g., in sodium, potassium and alkali metals there is one electron in the outside shell, in chlorine and the ↓halogens 7, in the ↓inert gases 8.

shell moulding – method of copying a shaped thing by coating it with a thin tough shell (e.g. of resin and sand) and then using the shell as a mould from which to cast copies.

she'llac (ʃe'læk) – purified ↓lac used to make varnish.

'shingles – inflammation and raised liquid-filled spots (caused by the same ↓virus as of chicken pox); the infection follows the branching out of a nerve, e.g. in a ring half round the chest. Also see herpes.

shock – (1) a state which results from a large burn or wound: there is a quick weak heart-beat, sweating, vomiting, low temperature, and, in the later stages, low blood-pressure: the reasons (bodily causes) and explanation of this state are not fully known; (2) emotional disorder (lasting only for a certain time) as a result of great strain – e.g. in a soldier as a result of battle; (3) effect on the body of a large electric current.

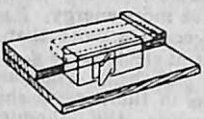
'shock absorber – part of a motor-car which damps (slows down) the action of the springs so as to produce smooth running; e.g. a piston working in a cylinder containing liquid;

the liquid is driven through a hole and flows back through another hole to slow down the bounce back of the springs.

shock treatment – ↓convulsion therapy.

shock wave – sharp, sound-like wave as from an explosion; it may travel faster than sound.

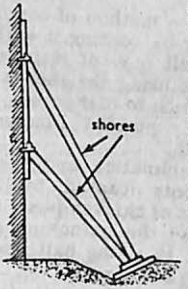
'shoddy ('ʃɔdi) – wool obtained by breaking up and pulling to pieces old woollen cloth; used to make new, cheap cloth.



SHOOTING-BOARD

shooting-board (shuteing-) – wooden step used in planing the edge of a piece of wood: the plane is laid on its side on the lower step, the wood is on the upper step.

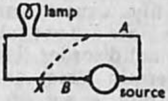
shore-up – hold up (e.g. an unsafe wall) with **shores** (posts).



SHORE-UP

short – easily broken, e.g. **short paste, shortbread** (made of flour + much fat); made up of small pieces, e.g. **short coal, short wood. short manure** – well-rotted horse-droppings with little straw (and no long pieces of unrotted straw) in it.

'short 'circuit – an accidental fault in electric wiring so that the terminals (ends) of a source (e.g. battery) are joined by wires with very little resistance; e.g. the wires *A* and *B* are short circuited at *X* allowing the electricity to flow without going through the lamp.

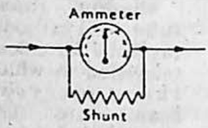


SHORT CIRCUIT

short sight – ↓myopia.

short wave radio – radio using 50 metres (or less) wavelength.

shunt (ʃʌnt) – a side path for an electric current so that not all the current passes through (e.g.) a measuring instrument or other apparatus. In the drawing a shunt (of low resistance) has been put across an ↓ammeter. If only $\frac{1}{10}$th of the current goes through the ammeter, the total current is known to be 10 times that shown by the ammeter; in this way a small ammeter can be used to measure a large current.



SHUNT

'shuteing – ↓shooting.

'shuttering – the wooden container into which liquid concrete (mixed cement and small stones) is poured when building; when the concrete has solidified, the shuttering is taken away.

'shuttle – the wooden container which carries the thread across between the long threads in weaving.

Si – chemical sign for ↓silicon.

sial (saiæl) – rock on which the land-masses are built (compounds of *si*lica and *al*uminium). The **sima** (*si*lica + *ma*gnesium) is the shell below the sial and the ocean floors.

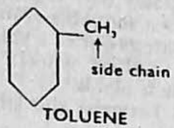
sial-/-o-/- (saiæl-) – of the saliva (liquid of the mouth), e.g. **si'alagogue** – drug which causes a flow of saliva.

/-sicc-/ – dry, e.g. **desiccated** – dried.

'sickle cells ('sɪkl -) – crescent-shaped (C-shaped) red cells in the blood (instead of the normal round cells) due to a hereditary disease; they cause ↓anaemia and (usually) death.

'side-bands – First see modulation. If a 2,000 kilocycle wave is modulated by a 5 kilocycle wave, we get new (extra) waves of 2,005 and 1,995 kilocycles. These extra frequencies (5 above and 5 below) are called the side-bands, and the **band-width** is 10 kilocycles.

'side-chain – hydrocarbon (or other) group which takes the place of a *H* atom in a ring compound (e.g. benzene).



TOLUENE

si'dereal (sai-

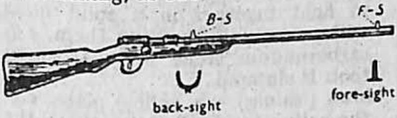
'diəriəl) – of the stars. **sidereal time** – time as calculated from the position of the star-group Aries ('eəri.iiz) in relation to the Earth: so also **sidereal noon** – when a certain point of Aries is on the N.–S. line overhead. **sidereal month** – 27·322 days. **sidereal year** – 365·256 days.

'siderite ('saidərait) – green or yellow iron ore found in ↓ sedimentary rocks, consisting of iron carbonate and clay (sometimes also coal).

'siderostat – instrument used to reflect light from a star in one direction (into a telescope) although the Earth is turning.

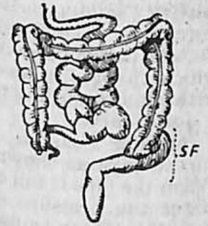
si'enna (si'enə) – a yellow earth used as colouring matter. **burnt sienna** – brown-red. **raw sienna** – brown-yellow.

sights of a rifle – parts of a rifle used in aiming, as shown.



SIGHTS OF A RIFLE

'sigmoid ('sigmɔid) – S-shaped. **sigmoid flexure** – the S-shaped part of the bowel just above the rectum (lowest, straight part just before the outlet).



SIGMOID FLEXURE

signs and 'symptoms (- - 'simptəmz) (of disease) – **signs** – things found by scientific study of the body of a sick person, e.g. changes in the shape or numbers of blood cells; bacteria, etc.; **symptoms** – things felt by the sufferer, e.g. pain, weakness.

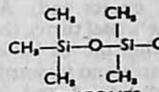
'silage ('sailidʒ) – ↓ ensilage, cattle food made by fermenting green stuff with sugar.

'silica ('silikə) – silicon dioxide (SiO_2) which occurs in crystalline forms (e.g. quartz) and as the main part of sand. Many rocks are **silicates** – salts formed by the joining of silica with metal oxides, e.g. calcium silicate $CaO.SiO_2$ (= $CaSiO_3$).

si'liceous (si'liʃiəs) – containing silica.

'silicon ('silikɔn) – the non-metallic element best known in the form of silica (= sand, silicon dioxide SiO_2).

'silicones ('silikounz) – plastic-like substances built up from rings or chains of silicon and oxygen atoms: –Si–O–Si–O– (see diagram). They are very resistant to water, heat and electricity, and are used for insulation in moist conditions and for polishing.



$$CH_3-\overset{\displaystyle CH_3}{\underset{\displaystyle CH_3}{\overset{|}{\underset{|}{Si}}}}-O-\overset{\displaystyle CH_3}{\underset{\displaystyle CH_3}{\overset{|}{\underset{|}{Si}}}}-O-$$

SILICONES

'sili'cosis ('sili'kousis) – a disease caused by breathing in particles of silica (stone-dust, sand), e.g. by stone-workers and miners.

'siliqua ('silikwə) – a long dry fruit containing seeds but with a thin wall down the middle. Found in plants of the wallflower family.

SILIQUA

'silo ('sailou) – a tower for storing grain; a tower for making ↓ silage.

silt (silt) – earth, sand, etc., deposited by a river or other flowing water; the grains vary between 1/10th and 1/100th of a millimetre across.

Silurian 'period (sai'ljuəriən -) – period about 375 million years ago. The rocks are red sandstones and shales (rocks made from layers of clay). They contain fossils of small sea creatures.

silver 'halides (- 'heilaidz) – silver fluoride (AgF) – chloride ($AgCl$), – bromide, ($AgBr$), – iodide (AgI). Silver chloride and silver bromide are light-sensitive substances used in photography.

silver nitrate – ($AgNO_3$), used to burn away warts (small growths on the skin), also, in solution with water, for the eye and inner passages of the body.

sima – ↓ sial.

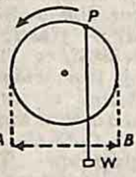
'simian ('simiən) – of monkeys.

'similar – of nearly the same kind;

like; **similar triangles** – triangles of the same shape but different size.

'Simmonds' disease – the usual signs of old age appearing too soon, as a result of disease of the ↓pituitary gland.

simple har'monic motion – Think of a string hanging from a point *P* on a wheel with a weight *W* on its end. As the wheel turns, the string moves backwards and forwards between *A* and *B*. If the wheel turns steadily, the to-and-fro motion is a simple harmonic motion. Many vibrations are simple harmonic motions, or nearly so, e.g. the swing of a pendulum, the up and down swings of a weight on the end of a spring, the vibrations of a thin bar which is fixed at one end.



SIMPLE HARMONIC MOTION

simul'taneous e'quations (siməl-'teiniəs –) – Example: there are two numbers x and y such that $x + 2y = 5$ and $2x + y = 4$; and both equations are true at the same time (= simultaneously). So also we can have 3, 4 . . . simultaneous equations bringing in 3, 4 . . . unknown numbers. Simultaneous equations can be solved (the values of x, y . . . found) by ↓determinants. If there are 2 equations, they are more easily solved thus:

$$\left.\begin{aligned} x + 2y &= 5 \\ 2x + y &= 4 \end{aligned}\right\}$$

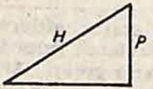
Multiply the first by 2 (to make the number in front of x the same in each equation):–

$$\text{Subtract}\quad \begin{aligned} \left.\begin{aligned} 2x + 4y &= 10 \\ 2x + y &= 4 \end{aligned}\right\} \\ \hline 3y = 6 \\ y = 2 \end{aligned}$$

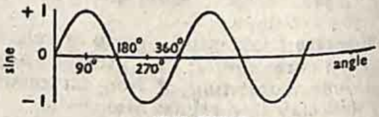
Using either of the equations, if y is 2, x must be 1.

'sinap-/ ('sinæp-) – mustard, e.g. **'sinapism** – a mustard plaster (put on the skin to bring blood to the part).

sine of an angle (sain -) – the length of the side oPposite to the angle divided by the length of the Hypotenuse (side opposite the right-angle), $\frac{\text{P}}{\text{H}}$. **sine curve** – wave-like curve formed by the graph showing how the sine of the angle changes with the size of the angle.



SINE OF AN ANGLE



SINE CURVE

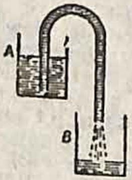
'sinister ('sinistə) – left hand; from right to left. **'sinistrorse** – (e.g. sea-shell) – having a right to left spiral shape.

'sinter ('sintə) – by means of heat and pressure, cause grains of a substance to hold together in a solid mass without actually melting them, e.g. carborundum stone for sharpening tools is sintered.

'sinus ('sainəs) – a hollow place, e.g. the hollow inside the bone above the eyes (frontal sinus); also the antrum (hollow inside the jaw above the teeth). For picture see antrum.

'sinu'soidal quantity ('sainuu'sɔidəl) – quantity (like a simple alternating current) which changes in size, with time, according to a ↓sine curve.

'siphon ('saifən) – curved pipe as shown. When the pipe is full of water the pressure of the atmosphere causes water to continue to flow from *A* to the lower level at *B*.



SIPHON

Si'renia (sai'riiniə) – (*siren* = mer-

SIRENIA (dugong)

maid, supposed half-fish, half-woman): group of mammals (breast-feeding animals) which live in water, e.g. the Dugong (sea cow).

'sisal ('saisəl) – fibre obtained from the agave (S. American plant of the lily family), used to make string and rope: the string is white with hard springy fibres.

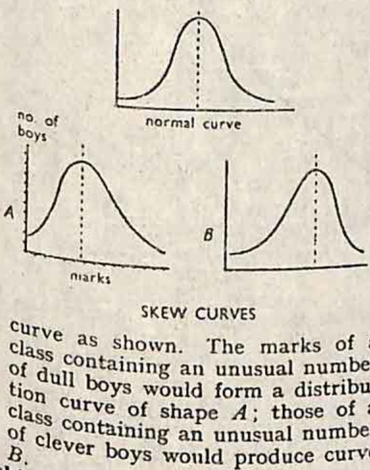
size (saiz) – glue mixed with a lot of water; mixed with colours for theatre-scene painting; put on wood floors before varnishing (to prevent the varnish from going into the wood). **sizing** (cloth) – putting size or other substances on cloth to stiffen it or add weight.

'skatole ('skætoul) – a substance formed by the action of bacteria on proteins in the bowel; it causes the unpleasant smell.

skep; skip – a container (e.g. bucket, basket) as used for moving (e.g.) ore or coal in mining; any large basket.

skew (skjuu) – twisted, e.g. skew arch.

skew curves (in a frequency distribution) – an asymmetrical (unbalanced) curve as shown. The marks of a class containing an unusual number of dull boys would form a distribution curve of shape *A*; those of a class containing an unusual number of clever boys would produce curve *B*.



SKEW CURVES

'skiagram ('skaiəgræm) – X-ray photograph. ↓ scia-/.

skid – (1) to slip; (2) a thing put under a heavy object so that it may slide along, e.g. under a boat so as to get it into the water.

skin effect – Alternating currents, especially of high frequencies, tend to flow near the surface of a wire and not through the middle. Hence the wire has a higher resistance than it has for a direct current.

skip – ↓ skep.

skip effect – Short radio waves go up to the ↓ Heaviside layer of the atmosphere and then are reflected down. The waves received in radio sets are these reflected waves. As a result there is an area near the sending station which is skipped (missed out) in which the waves cannot be received.

'skirting board – board round the base of the wall in a room.

'skiver ('skaivə) – piece of thin leather made by splitting off the surface of a skin.

slack – small pieces of coal and coal dust.

slack-water – period between tides when the water is neither rising nor falling.

slag – waste material and impurities which come to the top of melted metal.

slaked lime (sleikt) – hydrated lime, calcium hydroxide, $Ca(OH)_2$. Formed by the action of water on quicklime (CaO).

slat – a thin, narrow piece of wood.

slates (sleits) – thin plates of grey clay, hardened by heat and pressure in the Earth, used for roofs.

'sledge-hammer – heavy hammer with a handle 2–3 feet long.

'sleepers – the wooden cross-beams under railway lines.

'sleeping sickness – = ↓ 'trypanoso'miasis, a disease caused by the tsetse fly: the organism in the blood is a **'trypanosome**; it attacks the nervous system causing loss of mental powers and death.

'sleepy sickness – ↓ encephalitis.

'sleeve valve – a valve consisting of a

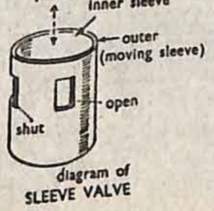


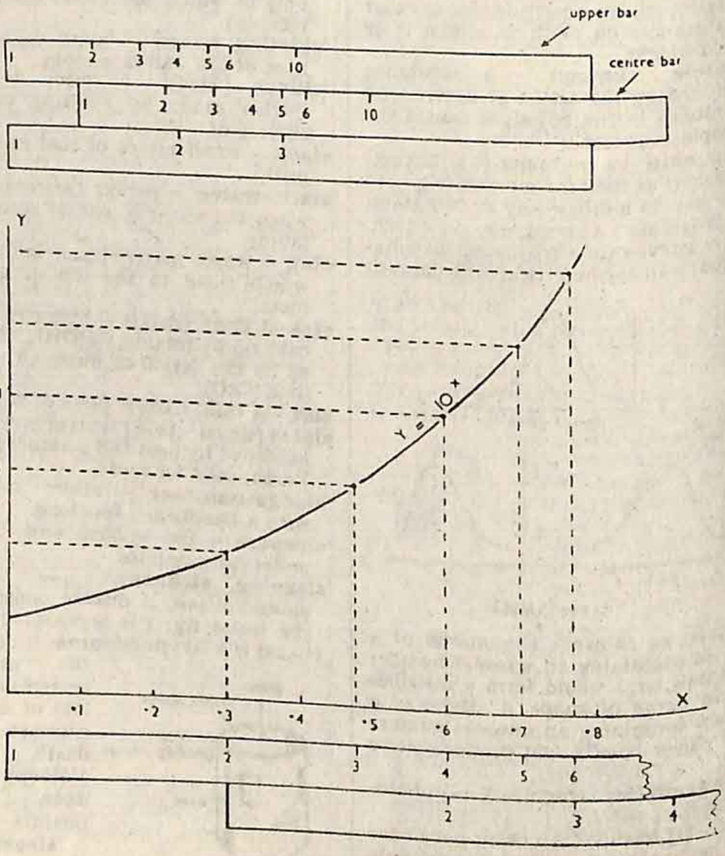
diagram of SLEEVE VALVE

sleeve (tube) round the cylinder of a petrol engine: holes in the tube come opposite holes in the cylinder, so letting in the petrol vapour or letting out the burnt gases at the right times.

sley (slei) – the comb-like part of a loom which is moved to press each cross-thread into place.

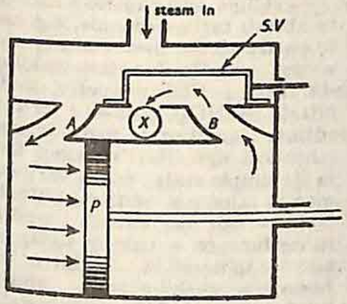
·slide-rule – instrument (as shown) for calculation. The figures on it are spaced out according to their ↓ logarithms, so that they get nearer and nearer together. Distance on the slide-rule represents the index (power) of 10; see middle diagram. To use the slide-rule (see bottom diagram) set 1 on the centre bar under (e.g.) 2 on the upper bar: now look at 3 on the centre bar and read 6 just above it (2 × 3 = 6). To multiply you *add* the logarithms. So here the log distance representing 2 is *added* to the log distance representing 3: and the result is the log distance representing 2 × 3: log 2 + log 3 = log of (2 × 3).

'slide valve – instrument in a steam-



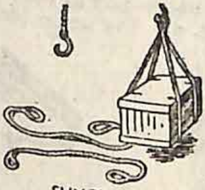
SLIDE-RULE

engine which lets steam pass to each side of the piston in turn. See diagram. In the position shown the Slide Valve is allowing steam to pass through pipe *A* to the left-hand side of the **Piston**: the used steam on the right-hand side is going through pipe *B* to the outlet *X*. Later the slide valve is pushed to the left so that steam goes in through *B* and out through *A* to the outlet *X*.



SLIDE VALVE

sling – loop (of rope, cloth, etc.) used to hold something up: e.g. arm in a sling. **slings** – loops of rope used for putting goods into a ship.



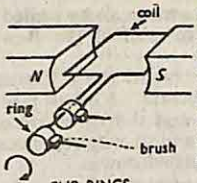
SLINGS

slip – (1) long thin piece of wood; (2) narrow stone (or carborundum) with a curved edge for sharpening a curved chisel; (3) liquid clay poured into a mould for casting pottery.

slip planes – When a piece of metal is pulled out of shape, the crystals (of which the metal is made up) slide over each other, as a pack of playing cards slides if pulled sideways. The sliding surfaces of the crystals are the slip planes; also called glide planes.

slip proof – trial printing made on a long piece of paper for the writer to correct: = galley.

slip rings – rings, turning on the same axle as the coil, by which electric current is led out of a generator. The brushes touching the rings pick up the current. So also for putting the current into an electric motor.



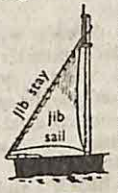
SLIP RINGS

'slip-stream – the stream of air made by the airscrew (propeller) of an aeroplane.

'slipway – sloping way up which a boat or small ship is pulled for repair or launched (put into the water) after building.

sliver ('slaivə) – soft loose band of cotton or wool fibres as it comes from the carding (combing) machine.

sloop – a sailing ship with one mast; like a ↓cutter, but it often has no bowsprit (bar which stands out in front). The front triangular sail (jib) is held on a stay (rope or wire holding up the mast).



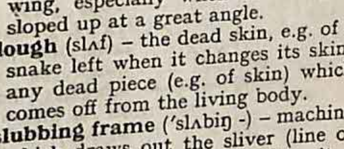
SLOOP

slot – long narrow hole; – (of aeroplane wing) an air passage near the front edge of the wing which lets air flow from underneath backwards and upwards so as to make the air flow more smoothly over the wing, especially when the wing is sloped up at a great angle.

slough (slʌf) – the dead skin, e.g. of a snake left when it changes its skin; any dead piece (e.g. of skin) which comes off from the living body.

'slubbing frame ('slʌbiŋ -) – machine which draws out the sliver (line of unspun cotton wool) and gives it a slight twist before spinning.

sludge – soft mud, e.g. which has settled down from drainage of a town in a sewage (drainage-purifying) works.



SLUDGE

sluice (sluus) – water-way with a gat (**sluice gate**) which can be pulled up or let down to control the flow of water.

'slump-test – test of the stiffness of cement or concrete. A small pile (of standard size and shape) of wet concrete is made and its height measured after it has settled down.

slurry – liquid mixture of cement and water.

smack – strongly built fishing-boat with sails and (usually) a motor and complete deck.

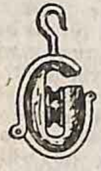
'smallpox – serious infectious skin disease due to a ↓virus. ↓vaccination.

'smelting ('smeltiŋ) – heating an ore (e.g. iron ore) with suitable materials (e.g. coke) so as to extract the metal (in a melted form).

smut (smʌt) – fungus disease which causes a black powder on grain (e.g. wheat, corn, etc.) and damages the seed.

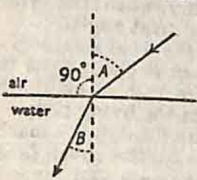
Sn – chemical sign for tin: (*stannum* = Latin name for tin).

'snatch-block – pulley in a block with a hole in the side of the block so that a rope can be put in through the side.



SNATCH-BLOCK

Snell's law – First see refraction. When a ray of light passes from one substance to another (e.g.) from air to glass) it changes its direction. Snell's law states the relation between the two angles. (↓sine of angle *A* ÷ sine of angle *B* comes to the same number for the two particular substances at whatever angle the light hits the boundary between the substances, e.g. air:water, sine $A \div \sin B = 4/3$. The value of sine *A* ÷ sine *B* is the ↓**index of refraction.**)



SNELL'S LAW

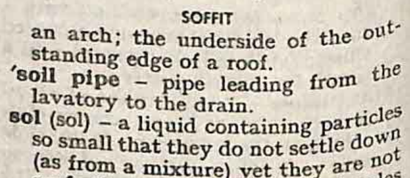
'soda ('soudə) – **baking soda** – sodium bicarbonate, $NaHCO_3$ (used in cooking): **washing soda** – crystalline sodium carbonate, $Na_2CO_3 . 10H_2O$.

'soda-lime – mixture made from ↓quicklime and caustic soda; used to absorb carbon dioxide, e.g. so as to purify air for men working under water; used also for glass-making.

soda nitre – Chili saltpetre, sodium nitrate ($NaNO_3$), used as a fertilizer.

'sodium ('soudiəm) – metal element, (chemical sign, Na): it is not found in its simple state, but is very common in salts, e.g. **sodium chloride,** NaCl – salt (as eaten). **'sodium bi'carbonate** – baking soda, used also for indigestion. **'sodium 'carbonate** – washing soda. **'sodium hy'droxide,** NaOH – caustic soda (a powerful alkali) used in purifying oils, manufacture of soap, cleaning paint, etc. **'sodium 'nitrate,** $Na.NO_3$ – Chile ↓saltpetre. **'sodium po'tassium 'tartrate** – Rochelle salt (↓Seidlitz powder). **'sodium 'silicate** – waterglass (for preserving eggs). **'sodium 'sulphate,** Na_2SO_4 – Glauber's salt (for the bowels). **'sodium 'thiosulphate,** $Na_2S_2O_3$ – "hypo" (for fixing photographs after developing).

'soffit ('sɔfit) – under-part of the head of an opening, e.g. the underside of an arch; the underside of the outstanding edge of a roof.



SOFFIT

'soil pipe – pipe leading from the lavatory to the drain.

sol (sol) – a liquid containing particles so small that they do not settle down (as from a mixture) yet they are not perfectly mixed with the molecules of the liquid as in a solution; a ↓colloidal solution.

'solanine bases ('sɔləniin) – alkaloids found in the Solanum family of plants, e.g. in potato leaves, tobacco-root, belladonna, etc.

'solar ('soulə) – of the sun, e.g. **solar system** – the sun and planets. **solar time** – Days are not exactly equal in length; a clock gives an average length of day; a sundial (showing time by a shadow) gives the real solar time.

solar battery – set of ↓ photoelectric cells by which sunlight is changed into electric power (e.g. in an artificial ↓ satellite.)

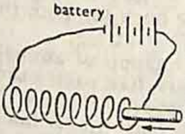
'solar 'plexus – ↓ plexus.

solar power – power, in a form suitable for use (e.g. electrical power), obtained directly from the sun's radiation.

'solder ('sɔldə) – lead + tin (or other easily melted alloy) used to join metals together. **soldering iron** – tool used in soldering.

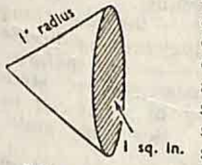
SOLDERING IRON

'solenoid ('sɔlenɔid) – a coil of wire round a tube. When a direct current of electricity passes through the coil, the coil acts as a magnet; e.g. an iron bar will be drawn into the hole in the centre of it.



SOLENOID

'solid 'angle – The corner of a triangle is a plane (flat) angle; the corner of a cube or of a cone is a solid angle. (The measuring unit of solid angles is the solid angle such that, if the radius is 1 inch, the area of the end is 1 square inch (see diagram). Also called a **ste'radian.**



SOLID ANGLE

'solidus ('sɔlidəs) – ↓ liquidus.

So'lignum (sɔ'lignəm) – trade name for a wood-preserving liquid.

'solstice ('sɔlstis) – On June 21st (about) the midday sun is overhead at places on the tropic of Cancer (23½ degrees north of the equator); in England it reaches its highest point in the sky. On December 22nd (about) the midday sun is overhead at places on the tropic of Capricorn (23½ degrees south of the equator): in England it is lowest in the sky. These two days are the solstices.

'soluble ('sɔljubl) – which can be dissolved in a liquid, e.g. sugar is soluble in water; it forms a **solution;** sand is not soluble in water; it is **insoluble.** **'solu'bility** of a substance – the weight of the substance which can be dissolved in a certain fixed amount of liquid, e.g. so many grammes in 100 grammes of water, at a certain temperature.

'solute ('sɔljut) – substance dissolved in a **'solvent** (a liquid), e.g. sugar is the solute in sugar-and-water; water is the solvent.

so'lution (sə'luuʃən) – (1) liquid with a substance (or substances) dissolved in it, e.g. salt water is a solution; (2) **solution of an equation** – finding the values of the unknown quantity (e.g. x) which make the equation true; the answers so found; (3) **solution of a triangle** – knowing certain facts about a triangle (e.g. lengths of 2 sides and the angle between them), finding the lengths of all the sides and the sizes of all the angles.

solvent – ↓ solute.

'soma ('soumə) – body. **so'matic** – of the body, e.g. **somatic cell** – body-cell (not reproductive cell).

/-some (-soum) – ("body"): part of a cell, e.g. **centrosome** – a small particle in the centre of a cell close to the nucleus; it divides into two to start the division of the cell. ↓ chromosome, karysome.

'somite ('soumait) – one division of the body of a ↓ metameric animal, e.g. of an earthworm.

som'nambulism (sɔm'næmbjulizm) – walking in one's sleep.

sonde (sɔnd) – small balloon carrying instruments sent up to measure the temperature, movement, etc., of the upper air.

'sorus ('sɔɔrəs) – group of spores (e.g. on a fern) with a cover.

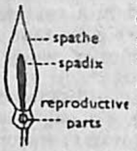
sounding rocket – rocket sent into the upper atmosphere as a means of studying the conditions there.

'soundings – measurements of the depth of the sea.

space charge – The hot wire (cathode) of a radio valve sends out electrons (negative particles). If these are not carried away, e.g. by the anode (positive plate), they form a cloud – a space charge – which stops the sending out of more electrons.

space time – ↓ Minkowski world.

'spadix ('speidiks) – In a flower like the arum lily, the middle pillar (with the reproductive parts near the bottom) is the spadix and the surrounding leaf-like part the **spathe.**

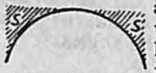


SPADIX

spall'ation (spæl-'eiʃn) – the breaking up of an atomic nucleus into many pieces as a result of being hit by a powerful atomic particle.

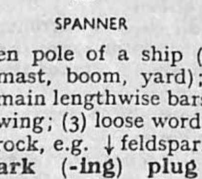
span – distance between, e.g., two pillars of a bridge, two posts carrying electric wire, the end of one wing (of an aeroplane) and the end of the other wing.

'spandrel (/-il) ('spændrəl) – the triangular space between an arch and a line drawn across the top of the arch; a triangular filling, e.g. in making a roadway over an arch.



SPANDREL

'spanner – tool used for screwing up (or unscrewing) nuts: the lower picture shows a **box - spanner.** ↓ tommy-bar.

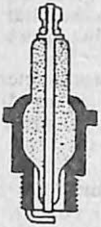


SPANNER

span-roof – ordinary roof with equal slope on both sides.

spar – (1) any separate wooden pole of a ship (e.g. part of the mast, boom, yard); (2) one of the main lengthwise bars of an aeroplane wing; (3) loose word for a crystalline rock, e.g. ↓ feldspar.

spark (-ing) plug – instrument screwed into the cylinder of a petrol engine; an electric spark is caused across its "points" so as to fire the vapour.



SPARK(-ING) PLUG

spasm (spæzm) – uncontrolled contraction of the muscles.

'spastic ('spæstik) – having to do with spasms, e.g. **spastic paraplegia** (paralysis) – a loss of power over the limbs, owing to brain injury, in which the muscles remain tight.

spathe (speið) – ↓ spadix.

'spathic iron ore ('spæθik) – impure ferrous carbonate ($FeCO_3$).

spatula ('spætjulə) – a flat blade used (e.g.) to press down the tongue when looking at the throat; used also to take up small amounts of chemicals and mix them. **spatulate** (fingers) – spoon-shaped; flat and broad at the ends.

'spavin ('spævin) – long-lasting inflammation of the hock-joint (in the middle of a horse's back leg).

'species ('spiiʃiiz) – group of animals or plants which are like each other and can breed together (mix in reproduction), e.g. *Felis leo* (= lion). The first word (*Felis*) is the name of the genus (larger group here, cats); the second word (*leo*) is the **specific** name, the name of the species (smaller group inside the genus).

spe'cific (spe'sifik) – for one thing only, e.g. (medicine) for one disease only, e.g. quinine – for malaria; (stain) – substance used to stain (colour) one kind of plant-cell or animal-cell only. See also unde "species" (above).

spe'cific 'gravity – the relation between the weight of a certain volume (e.g. one cubic inch) of any substance and the weight of the same volume of water (at 4° C.): e.g. any volume of gold weighs 19·3 times the weight of the same volume of water.

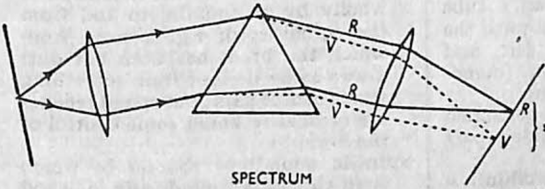
spe'cific 'heat – the amount of heat needed to raise a certain mass (weight) of a substance through so many degrees divided by the heat needed to do the same thing to the same mass of water. In the case of a gas there are two specific heats: – (1) if we keep the gas at the same volume while we heat it; and (2) if we let the gas expand so that its pressure does not change: (2) is the bigger because, as the gas expands, it does some work (e.g. pushes back a piston) and we must supply extra heat to make up for this.

spe'cific resis'tivity – electric resistance (in ↓ohms) of a piece of material of a certain size (1 centimetre long and of cross area 1 square centimetre).

spe'cific 'volume – cubic inches per pound.

'spectro-/ ('spektro) – of the ↓spectrum, e.g. **'spectrograph** – instrument used for photographing the spectrum. **spec'trometer** – instrument for making measurements of a spectrum. **'spectroscope** – instrument for seeing the spectrum.

'spectrum ('spektrəm) – (1) band of colours formed when light is spread out by a prism or a ↓diffraction-grating. See diagram; V = violet light; R = red light. An incandescent solid (solid heated so that it gives out light), e.g. the white-hot wire in an electric lamp, gives a spectrum which has all the colours. This is a **continuous spectrum.** If a gas or vapour consisting of atoms is made to send out light (e.g. by being made hot or by having an electric current passed through it), light of certain colours only is sent out: this spectrum consists of lines of colours with black spaces between; this is a **line spectrum.** But if the gas or vapour consists of molecules (not of separate atoms) the spectrum consists of bands of colour (actually groups of very close lines) with dark spaces between: this is a **band spectrum.** If white light is sent into a substance (e.g. a gas, a solution) certain colours may be absorbed (taken away): so the spectrum of the light which comes through shows black gaps. This is an **absorption spectrum** (it may consist of black lines or black bands). The absorption-spectrum of a cool vapour has dark lines in exactly the same places as the bright lines in the line-spectrum given out by the same kind of hot vapour: ↓Fraunhofer lines. (2) a similar band formed when radio waves, ↓beta-rays, X-rays, etc., are spread out according to their wavelengths.



SPECTRUM

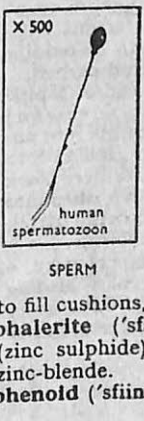
'speculum ('spekjuləm) – (1) instrument reflecting light through a tube, used for looking into an opening in the body, e.g. the ear; (2) copper-tin alloy used in optical instruments.

spee'dometer (-'dɔmitə) – instrument for measuring speed, e.g. by a small electric generator working a magnet which pulls a needle against a spring.

'spelae'ology ('spiili'ɔlədʒi) – scientific study of caves and of the plant-life and animal-life in them.

'spelter (s'peltə) – impure zinc, as ordinarily used (not as for chemistry).

sperm (spəəm) – a male reproduction cell.



SPERM

'sperma'ceti ('spəəmə'siiti) white wax from a whale.

'Spermato'phyta – the large group of seed-bearing plants.

'spermato'zoa – male reproduction cells; singular /-zoon.

'sphagnum moss (s'fægnəm) – moss which grows in moist places, used to fill cushions, etc.

'sphalerite ('sfælərait) – zinc ore (zinc sulphide), also called blende, zinc-blende.

'sphenoid ('sfiinɔid) – wedge-shaped.

sphere (sfiə) – round ball. **'spherical abe'rration** ('sferikəl -) – A lens is a part of a ball. If the lens is a large part of a small ball the rays from the edge do not come to the same focus (point) as the rays from the centre part; so the picture is not clear: there is a spherical aberration. If the lens is a small part of a large ball there is still this difference, but it is so small that it may not matter; or it may be set right by using a special arrangement of lenses.

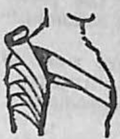
'sphincter ('sfiŋktə) – muscle which goes round a tube and closes it, e.g. round the outlet of the bowel.

sphygmo-/ (sfigmo-) – of the pulse (blood-impulses caused by the heart), e.g. **'sphygmograph** – instrument which draws a line showing the pulse.

SPHYGMOMANOMETER

'sphygmo-ma'nometer – instrument for measuring blood pressure, e.g., by blowing up a tube fixed tightly round the arm until the pulse below it cannot be felt, and then reading the pressure: (manometer = pressure-measurer).

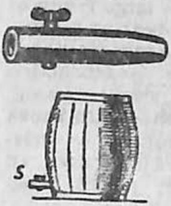
'spica ('spaikə) – bandage wrapped round a wounded part as shown.


SPICA

'spicule ('spikjul) – small spike, any small pointed thing.

'spiege'leisen ('spiigəl'aizən) – iron containing about 30% manganese and about 5% carbon, added to steel to de-oxidize it and add manganese and carbon.

'spigot ('spigət) – plain end of a pipe (not screwed) which fits into another pipe, or into a container; block or tap pushed into the hole in a barrel, e.g. of wine.



SPIGOT

'spillway – channel leading excess water away from a reservoir or water-storage place.

spin (atomic particles) – Elementary particles (e.g. electron, proton) act as if they were spinning; the spin is measured by the ↓ angular momentum.

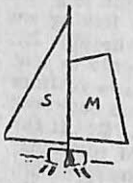
'spina 'bifida ('spainə-'bifidə) – faulty development of the spine so that there is an opening through which the spinal cord may come out and produce a swelling in the back.

'spinal ('spainəl) – of the ↓ spine. **spinal anaesthesia** – preventing sensation of a lower part of the body from reaching the brain by injecting a drug into the space round the spinal cord. **spinal column** – the backbone. **'spinal 'cord** – The brain is the upper part of the central nervous system: the spinal cord is the lower part, in the spinal column: much of the automatic action of the body is carried on through the spinal cord, usually under some control by the brain. **'spinal 'reflex** – an automatic movement caused by a nerve impulse to and from the spinal cord. (Such a reflex motion may take place wholly by an impulse to and from the spinal cord, e.g. a frog (from which the brain has been cut out) draws away its foot from something which causes pain; but spinal reflexes are ordinarily under some control of the brain.)

spindle (spindl) – rod on to which spun thread is wound; any long rod pointed at both ends.

spine (spain) – (1) backbone; ↓ spinal; (2) (of a book) – the back, where the pages are joined together; (3) sharp pointed thing, e.g. on a prickly animal or plant.

spi'nel (spi'nel) – mineral crystals (e.g. aluminates) sometimes used for imitation precious stones, e.g. **ruby spinel** – a red imitation precious stone.



SPINNAKER

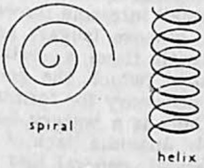
'spinnaker ('spinəkə) – a very large extra sail on the opposite side from the mainsail.

'spinne'ret – organ from which the spider draws out the thread to make its web.

spin'thariscope– instrument for seeing radium particles as bright spots on a surface of zinc sulphide: (*spinthar-* = spark).

'spiracle ('spairəkl) – outside opening of a breathing tube of an insect (or similar opening in some spiders, whale, etc.).

'spiral ('spairəl) – (1) Ordinary use – a screw curve, e.g. a spiral spring or a wire wound round a bar; but this is correctly named a helix and such a spring would be a helical spring. (2) Correct use – a plane (flat) curve going round and round a centre and always getting further away from it.



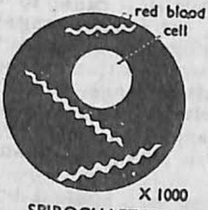
SPIRAL

spirals, spiral nebulae (-'nebjulii) – Nebula ("cloud") – a bright (or dark) area in the sky which remains fixed in relation to the stars. The spiral nebulae are such bright areas of spiral shape; e.g. the Great Nebula in Andromeda. The Nebulae were so called because they were believed to be clouds of gas or vapour, but the spiral nebulae are, in fact, very distant groups of stars, and are now called **spiral galaxies.**

'spirit level – instrument containing a bubble in a liquid, e.g. alcohol, used to see if a surface is level.

SPIRIT LEVEL

'spiro'chaetes ('spairə'kiits) – parasites of the shape as shown, e.g. those causing ↓syphilis and infectious ↓jaundice. (The round thing in the picture is a blood cell; the wavy lines are spirochaetes magnified × 1,000.)



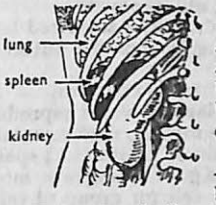
SPIROCHAETES

spit – the depth of a hole made in the ground by a spade; small piece of land running out into the sea.

'splanchnic ('splæŋknik) – of the inside organs of the body.

splayed (spleid) – sloped, cut off at an angle, e.g. **splayed brick** – brick with one sloping edge.

spleen – organ lying behind the stomach, as shown: it is a store of blood and makes new blood cells. It becomes enlarged in malaria.

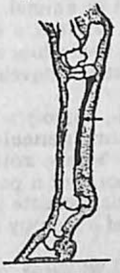


SPLEEN (seen from back)

splice (splais) – join two ropes by pushing the strands of one rope under the strands of another rope; join two pieces of cinema film.

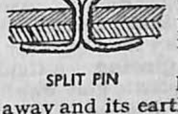
splint – stiff metal or wooden piece used to keep parts of a broken bone from moving.

splint bones – bones in a horse's leg as shown. Comparing with a man's hand, a horse walks on its middle finger: the little finger and thumb have disappeared; the 1st and 3rd fingers have become very small and are the splint bones.



SPLINT BONE

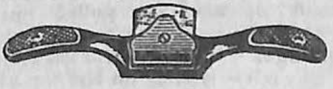
split pin – pin with leg divided into two parts: these legs are opened out on the far side to prevent the pin from falling out.



SPLIT PIN

spoil – When a high place is cut away and its earth used to fill a low place in making a road, some earth may be left over; this extra earth is the spoil.

'spokeshave ('spoukʃeiv) – tool as shown for cutting long thin pieces off a piece of wood so as to shape it.



SPOKESHAVE

'spondy'litis ('spɔndi'laitis) – inflammation or decay of bones of the spine.

spon'taneous (spɔn'teiniəs) – of itself, automatically, without an outside cause, e.g. **spon'taneous ig'nition** – catching fire of itself (without being set alight), e.g. hay (dried grass) because of heat of fermentation.

spool – (wooden) shape on which thread, wire, etc. is wound.

spo'radic (spɔ'rædik) – scattered here and there, e.g. a sporadic outbreak of disease.

spo'rangium (spɔ'rændʒiəm) – an organ of a plant in which reproductive units are formed, used especially of the containers in which ↓spores are formed, e.g. of a fungus or moss.

spore (spɔɔ) – cell (or group of cells) set free from a low form of plant, e.g. fern, fungus, or from a very simple form of animal life, which can grow into a new plant or animal. A spore may be formed without a sex process, and (unlike a seed) does not contain an embryo (little undeveloped plant or animal).

spori-/, sporo-/ (spɔri-, spɔro-) – of or by spores, e.g. **'sporo'genesis** – formation of spores. **'sporo'zoites** (-'zouaits) – active spores of a parasite such as the malaria parasite (injected into the blood of a man by the mosquito). ↓/-zoite.

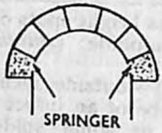
sport – plant or animal which is very different from the others of its kind. ↓mutation.

spot welding (- weldiŋ) – way of joining two sheets of metal; a heavy current of electricity is passed through a very small area of both sheets so that they melt together at this spot. **spot glueing** – a similar process using a plastic glue which is made to set by heating it with a high-frequency electric current.

sprain (sprein) – damaged muscle (or fibres of a joint) caused by an excessive pull or a twist: (the bone is not damaged or pulled out of place).

springer – the lowest curved stone of an arch – it rests on the top of the pillar.

spring tides – very high (and very low) tides at New and Full Moon, i.e. when the sun and moon act together.


SPRINGER

'sprocket-wheel ('sprɔkit -) – wheel with teeth which fit into a chain, e.g. the chain wheels of a bicycle are sprocket wheels.

sprue (spruu) – tropical disease causing failure of the small intestine (bowel) to absorb fat, glucose (sugar) and calcium, and with them a certain outside substance (which the body cannot make) necessary for forming blood cells. There is a watery flow from the bowels, anaemia (lack of or weakness of blood), general loss of strength. The disease is treated with ↓folic acid. The cause is not fully known.

sprue – (moulding): extra material which must be cut away from an injection moulding (thing made by forcing paste into a mould).

spur wheel (spəə -) – gear-wheel for driving an axle which is parallel to its own axle, as in the gear-box of a car, or in a clock.

'sputum ('spjuutəm) – matter from the nose, throat and lungs thrown out from the mouth.

'squama, 'squamata ('skweimə – 'skweimətə) – scale(s), plate(s) as on the skin of a snake. **squamous, -ose,** adj.

squee'gee (skuii'dʒii) – stiff rubber blade used for pressing water off a surface or pressing paper down on to a surface to stick it.

SQUEEGEE

squint – ↓strabismus.

Sr – chemical sign for ↓strontium.

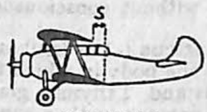
St – ↓Saint.

'stabilize ('steibilaiz) – cause to be stable (steady, not easily changed). **sta'bility** (stə'biliti) – tendency to remain in one state, or to come back to that state after change.

stable equi'librium – ↓equilibrium.

staff (staaf) – axle in a watch, e.g. **balance staff** = axle of the balance wheel.

'staggered – not in a straight line

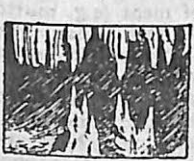


STAGGERED

one behind the other – e.g. wings of a biplane (aeroplane with two wings). **staggered hours** – arrangement so that one set of workers starts (and finishes) work a short time after another, so that all do not come and go at once.

stainless steel – alloy of steel with chromium (or chromium and nickel); it is not affected by water or weak acids.

'stalactite ('stæləktait) – long needle of calcium carbonate hanging from the roof of a cave in limestone rocks. **'stalagmite** ('stæləgmait) – similar needle, but standing up from the floor.

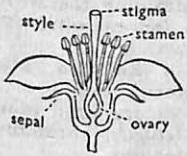


STALACTITE

stall (stɔɔl) (engine) – stop because the brakes are put on too quickly, or the hill is too steep; (aeroplane) – lose climbing-power and tend to fall backwards, e.g. because the nose is turned upwards when the speed is too slow.

'Stalloy ('stælɔi) – silicon-iron alloy used for the iron parts of electromagnets in electrical machines: (trade name).

'stamen ('steimen) – the part of the flower which carries the sacs (bags) in which pollen (male cells) is produced. **'staminate** ('stæmineit) – having stamens but no ovary (female part).



STAMEN

'stanchions ('staanʃiənz) – iron or steel posts helping to hold up a beam.

'standard ('stændəd) – as clearly described and agreed on for general use; e.g. **standard film stock** – 35 millimetre film as generally used in cinemas. **standard gauge** (railway) – 4 feet 8½ inches distance between the lines in Britain.

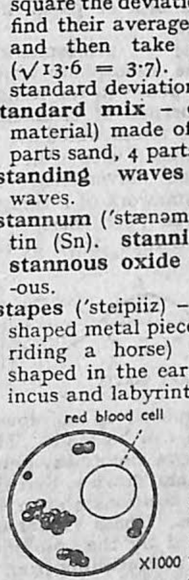
'standard 'devi'ation – deviation = difference of a mark, measure, etc., from the average, e.g. for the marks 1, 3, 6, 9, 11: average is 6; the deviations (= each mark minus the average) are 1 − 6 = − 5, 3 − 6 = − 3, etc., i.e. − 5, − 3, 0, + 3, + 5. To obtain a measure of the amount of deviation of the set of marks from the average, we cannot take the average of the deviations because this always comes to 0 (zero). We square the deviations (25, 9, 0, 9, 25), find their average (68 ÷ 5 = 13·6), and then take the square root ($\sqrt{13{\cdot}6} = 3{\cdot}7$). The answer is the standard deviation.

standard mix – concrete (building material) made of 1 part cement, 2 parts sand, 4 parts small stones.

'standing waves – ↓ stationary waves.

'stannum ('stænəm) – Latin name for tin (Sn). **stannic oxide** – SnO_2. **stannous oxide** – SnO. ↓ -ic, ↓ -ous.

'stapes ('steipiiz) – ("stirrup" = D-shaped metal piece for the foot when riding a horse) – small bone so shaped in the ear. For pictures see incus and labyrinth.



STAPHYLOCOCCUS

'staphylo'coccus, -i ('stæfilo'kɔkəs, -kai) – ("bunch of grapes"): round bacteria in groups which cause infection of wounds and ↓ abscesses.

staple (steipl) – ∩-shaped nail pointed at both ends; same-shaped loop to hold the end of a bolt or lock.

staple (of cotton) – length and strength of the fibre.

star tracker – a ↓ servo-mechanism in which a small telescope is automatically kept pointing at a chosen bright star in spite of the movement of the rocket (guided missile, etc.) which carries the telescope. Used in automatic navigation.

Stark effect – When a source of light (e.g. a sodium flame) is placed in a strong electric field each line of its

↓ spectrum is divided into several close lines.

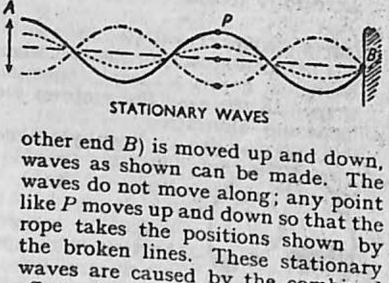
'stasis ('steisis) – stopping, e.g. **intestinal stasis** – stopping of the passing of matter through the bowels, e.g. because the muscles of the bowel are weak; also used of blood.

'static ('stætik) – standing still, not moving. **static electricity** – an electric charge which is not moving (not an electric current), e.g. a rod of resin or glass rubbed with cloth so that it attracts bits of paper has static electricity.

'statics ('stætiks) – atmospherics, electricity in the atmosphere which causes cracking noises in the radio.

'statics – that branch of mechanics which deals with forces which are in equilibrium (balance each other so that there is no movement), e.g. forces in the framework of a bridge.

'stationary 'waves ('steiʃənəri) – If one end (*A*) of a rope (fixed at the other end *B*) is moved up and down, waves as shown can be made. The waves do not move along; any point like *P* moves up and down so that the rope takes the positions shown by the broken lines. These stationary waves are caused by the combined effect of one wave travelling from *A* to *B* and a reflected wave travelling back from *B* to *A*. So also the vibration of air in pipes of a musical instrument and alternating currents in a radio aerial. ↓ antinode, node.



STATIONARY WAVES

sta'tistics (stə'tistiks) – (1) numerical information, e.g. marks, heights of people, weight of crops, properly collected and arranged. (2) the branch of mathematics which deals with obtaining the meaning from such numerical information.

'stator ('steitɔ) – the fixed (not moving) part of an electric generator or motor.

'status epi'lepticus ('steitəs epi'leptikəs) – ↓ epileptic seizures one after another without consciousness between.

'status lym'phaticus (- lim'fætikəs) – a condition of the body in which the *lymph glands and ↓ thymus gland are enlarged; persons in that condition tend to die when given an anaesthetic (e.g. chloroform): *(clear liquid in the body which flows into the bloodstream).

staves (steivz) – curved pieces of wood, e.g. sides of a barrel.

stea-/ – fat, e.g. **ste'apsin** (stii'æpsin) – ↓ enzyme which attacks fat.

ste'aric acid (stii'ærik) – the acid which, combined with glycerine, forms the hard fat of meat (e.g. mutton); $CH_3.(CH_2)_{16}.COOH$. Many other fats and oils are similar. **stearin** ('stiiərin) – the fat so formed.

'steatite ('stiiətait) – soap-stone, stone easily cut into ornaments; when heated it becomes very hard and is used for electrical work: talc (powder used on babies) is powdered steatite.

'steato-/ ('stiiətou-) – fat, e.g. **'steato'rrhoea** ('stiiətə'riiə) – flow of fatty substance from the bowel.

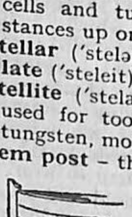
'Stefan's law, 'Stefan-'Boltzmann law ('stefæn 'bɔltsmæn) – law telling how the rate of radiation (sending out) of energy in the form of heat and light, by a ↓ Black Body depends upon the temperature. The rate is proportional to (Temperature)^4. (The temperature is measured from absolute zero, −273° C.)

stele (stiil) – middle part of a plant-stem or root containing the woody cells and tubes for carrying substances up or down.

'stellar ('stelə) – of the stars. **stellate** ('steleit) – star-shaped.

'stellite ('stelait) – very hard alloys used for tools: (cobalt, chromium, tungsten, molybdenum).

stem post – the front upright post of a ship.



STEM POST

steno-/ (steno-) – narrow. **ste'nosis** – narrowing, e.g. of the ureter (through which urine passes out) or of the ↓ mitral valve of the heart (as a result of rheumatic fever).

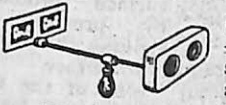
'stenter ('stentə) – ↓tenter (frame for stretching cloth).

step-up transformer – a ↓transformer which increases the voltage (pressure) of an alternating electric current. **step-down transformer** – a transformer which decreases the voltage of an alternating electric current.

steradian – ↓solid angle.

sterc-/-o-/ ('stəəko-) – having to do with the faeces (waste matter of the bowels), e.g. **'sterco'bilin** = brown colouring matter of the faeces.

'stereo-/ – ("solid"): e.g. **'stereo'scopic vision** ('sterio'skɔpik) – the power of seeing things as solids. Each eye gets a slightly different picture of a thing, e.g. the left eye sees a little more of the lefthand side than the right eye sees: thus one gets the idea of solidness; one can also judge the distance of a thing by stereoscopic vision. **stereoscope** – instrument by which two pictures of the same thing are combined to give a solid appearance.



STEREOSCOPE

'stereo'chemistry – study of the way in which the atoms (in a molecule) are arranged in space (not as if drawn on a flat surface).

'stereo-i'somerism (- ai'sɔmərizm) – ('isomers = chemical substances whose molecules contain the same atoms but differently arranged). stereo-isomers – isomers in which the atoms are differently arranged in space, e.g. the two forms of lactic acid, $CH_3CHOH.COOH$. (1) shows how the atoms are joined; (2) shows the two possible arrangements (A and B) in space. Such isomerism occurs when 4 different groups are joined to one C atom. (This is an **asy'mmetric carbon atom.**) ↓cis-compounds show another way in which there can be stereo-isomerism.

'stereo'phonic reproduction ('steriou'fɔnik -) – way of reproducing sound so that the sound seems to come, not from one loudspeaker, but from various directions in space, e.g. the sounds made by different instruments in an orchestra seem to come from different places corresponding to where they are arranged in the concert-hall.

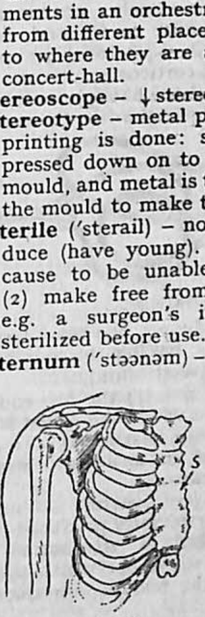
stereoscope – ↓stereo-/.

'stereotype – metal plate from which printing is done: soft material is pressed down on to type to make a mould, and metal is then poured into the mould to make the stereotype.

'sterile ('sterail) – not able to reproduce (have young). **sterilize** – (1) cause to be unable to reproduce; (2) make free from bacteria, etc., e.g. a surgeon's instruments are sterilized before use.

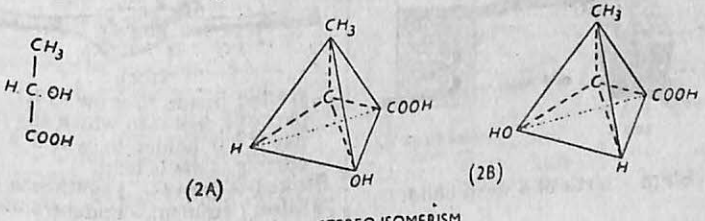
'sternum ('stəənəm) – the breast-bone. **'sterno-/-** e.g. **'sterno-'mastoid muscle** – muscle running from the sternum to the back of the ear; it pulls the head over to one side.

'sternu'tation – sudden impulse of air from the nose and mouth – as in a cold; sneezing.

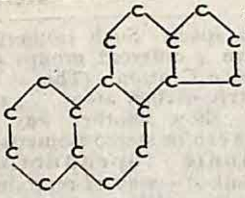


STERNUM

'sterols, /-sterol ('sterɔlz) – alcohols



STEREO-ISOMERISM



STEROLS

containing the set of carbon rings, as shown. ↓ **cho'lesterol** – is found in all animal cells: ↓ **er'gosterol** – in yeast. Vitamin D is a sterol found in yeast. The acids of the liver, and the sex-hormones are sterols. **ste'rone** – compound similar to a sterol, containing a –CO– (↓ ketone) group of atoms, e.g. ↓ corticosterone.

'stethoscope ('steθəskoup) – instrument used for listening to sounds inside the body, e.g. the heart-beats.

STETHOSCOPE

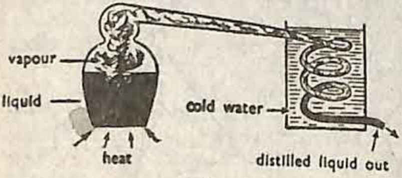
stib-/ (stib-) – having to do with ↓ antimony (= stibium).

'stigma (stigmə) – (1) the top end of the ↓ style, on which the pollen falls. For picture see pistil; (2) a mark (e.g. on a leaf, on an insect's wing). Plural **stigmata.**

stil'boestrol (stil'biistrɔl) – name given to an artificially produced substance similar in its action to oestrogen (a substance which causes activity of the female reproductive organs).

stiles (stailz) – upright beams in a frame-work.

still – instrument used for ↓ distilling, as shown.



STILL

still-birth – birth of a dead child.

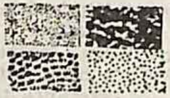
'stimulants ('stimjulənts) – drugs which excite and strengthen (for the time), e.g. tea, coffee, strychnine.

'stimulus ('stimjuləs) – something which produces an answering action in a living thing, e.g. light, sound, a prick.

stipe (staip) – thick stem of the fruit of a fungus, e.g. the leg of a mushroom.

stipel – ↓ stipule.

stipple – dots or lines used in shading in a printed picture-block made from a pen drawing; (painting) – rough surface produced by pressing or striking the end of the brush against the surface.



STIPPLE

'stipule ('stipjul) – one of the two parts like small leaves sometimes found at the bottom of a leaf-stem. **'stipel** ('staipel) – similar part at the bottom of each leaf of a compound leaf.

STIPULE

stirps (stəəps) – kind of plant which keeps its character, does not change when grown and fertilized by other plants of the same seed; plural, **'stirpes** ('stəəpiiz).

sto'chastics (stɔ'kæstiks) – the mathematical study of a process involving many individuals (e.g. the growth of a colony of bacteria, the changing numbers of charged particles in a shower of ↓ cosmic rays) in which the behaviour of the individuals is affected by the laws of chance (probability).

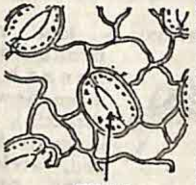
stock – (1) the stem of a plant on to which a branch of another plant is grafted (made to grow in it); (2) the part of a tool into which the blade is fixed; (3) holder in which a screw-cutting ↓ die is held.

STOCK

Stokes-Adams – ↓ syndrome.

'stolon ('stoulɔn) – underground stem, e.g. the stems on which potatoes are formed.

'stoma ('stoumə) – ("mouth"): small opening in the surface of a leaf by which gases pass in and out of the leaf: plural **'stomǝta.**



STOMA

/-stomy (-stəmi) – making an artificial opening by surgery, e.g. **gas'trostomy** – . . . in the stomach so as to pour in food when food cannot be taken through the mouth.

stool – medical name for matter passed out from the bowel.

stop – (photography) – opening (which can be made larger or smaller) behind or between the lenses of a photographic camera.

'stop-cock – tap for turning off water supply to a building (or part of a building).

'storage battery ('stɔɔridʒ-) – set of lead (or nickel-iron) cells used for storing electricity, as in a motor-car.

store (computer) – In a computer (calculating machine), the "memory" part where numbers can be stored for future use.

Sto'vaine (sto'vein) – a pain-preventing drug used instead of cocaine, especially for injection into the spine: ↓spinal anaesthesia: (trade name).

stoved (stouvd) – (paint, enamel) – heated to dry it quickly and make it very hard (as on a bicycle).

stra'bismus (strə'bizməs) – squint (state in which the two eyes look in different directions).

strain (strein) – change in size or shape of a Body caused by forces acting on it, e.g. the stretching of a spring by a pull at its end; measured by change in length (or volume) ÷ original length (or volume), or measured by angle of ↓shear.

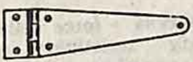
strain – e.g. a pure strain (of animal, plant, etc.) – set of living things which is not from mixed parents and does not produce mixed offspring.

strake (streik) – one line of boards running from end to end of a ship's side; the **garboard strake** ('gaabəd -) is the bottom line nearest the ↓keel; so also rows of plates in a steel ship.

strand – Yarns (threads) are twisted together to make strands, and three or four strands are twisted together to make a rope.

'strangler – = ↓choke (of car).

strap hinge – hinge (on which a door turns) with a long leg screwed on to the surface of the door.



STRAP HINGE

strass – heavy dense glass used for making artificial jewels.

'strata ('straatə) – layers of rock in the Earth, originally level but often broken and bent by Earth movements: singular – a **stratum.**

strati-/ – of strata, e.g. **stra'tigraphy** – study of the age, nature, etc. of the rock layers in the Earth's crust.

'stratified ('strætifaid) – found in layers, e.g. **stratified epithelium** – skin made up of several layers of different cells.

'strato-'cumulus clouds ('straato-'kjuumjuləs) – large masses of cloud with blue showing between.

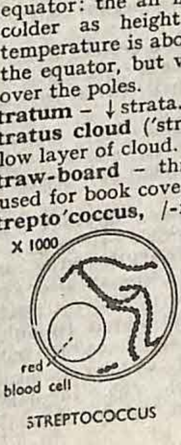
'stratosphere ('strætosfiə) – layer of the Earth's atmosphere; its lower surface is about 6 miles up at the N. and S. poles; about 11½ at the equator: the air no longer becomes colder as height increases. The temperature is about −110° F. over the equator, but warmer (−40° F.) over the poles.

'stratum – ↓strata.

'stratus cloud ('straatəs -) – a grey low layer of cloud.

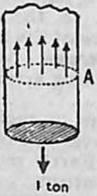
'straw-board – thick cardboard as used for book covers.

'strepto'coccus, /-i ('strepto'kɔkəs, -kai) – bacteria growing in chains as in infections of the nose and throat, in puerperal fever (infection in childbirth). ↓erysipelas, scarlet fever.



STREPTOCOCCUS

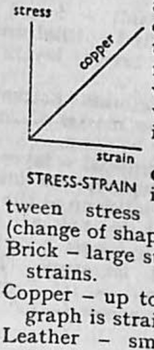
'strepto'mycin ('strepto'maisin) – a substance like ↓penicillin but obtained from *Actinomyces griseus* ("star-shaped-fungus grey"); it is (unlike penicillin) active against certain (but not all) diseases caused by the ↓tubercle bacillus, e.g. tubercular meningitis (infection by T.B. of the membranes covering the brain).



STRESS

stress – force inside a Body resisting strain (change of size or shape); e.g. if a force of 1 ton pulls on the end of a bar there are inside forces equal to 1 ton, pulling across any area such as A, and acting against the outside force. (Stress is measured as force ÷ area over which it acts, e.g. in tons per square inch.)

stressed-skin – way of building an aeroplane so that the outer shell (not a system of beams and rods) carries the weight and resists the various forces of flying.



STRESS-STRAIN

stress-strain curve – graph showing the relation between stress (force) and strain (change of shape) for a substance.

Brick – large stresses for only small strains.

Copper – up to a certain limit, the graph is straight (↓Hooke's law).

Leather – small stress for large strain.

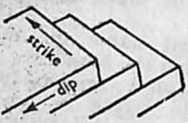
stretcher – brick laid longways; instrument for carrying a wounded person lying down; foot-board in a rowing boat.

'stria, -ae ('straiə, 'strai.ii-) – long coloured mark(s), stripe(s), e.g. **'striae gravi'darum** – grey marks on the skin of a woman after child-bearing, due to excessive stretching of the skin. **stri'ated muscles** – voluntary (= which one can control) muscles; they have microscopic dark bands across; the involuntary muscles, e.g. of the bowel, are not striated.

'stricture ('striktʃə) – a narrowing, e.g. of the urethra (urine outlet) due to disease.

STRIDOR

'stridor ('straidɔə) – loud noise produced by breathing when the wind- (breath-) pipe is partly stopped. **'stridulating organ** ('stridju-) – the organ with which some insects (e.g. crickets, grasshoppers) make a noise.



STRIKE-LINES

strike (straik) – level direction at right angles to the direction of dip (sloping down) of rock layers. **strike-lines** – lines on a (geological) map showing this.

STRIKING PLATE

'striking plate – the metal plate on a door-post on which the spring-bolt rubs (and then slips behind it) when a door is shut.

stringer beams, stringers – beams lying longways in a bridge or frame: the upright beams are called piers or stanchions.

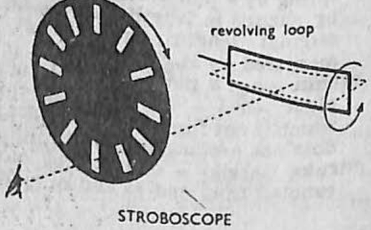
STROBILUS

'strobil-/ ('strɔbil-) – cone (as of pine tree).

strobilus – a cone.

strobilate – like, of the nature of, a cone.

'stroboscope ('strɔboskoup) – instrument for measuring the speed of rotation or correctness of shape of a thing. In its simplest form it is a circular plate



STROBOSCOPE

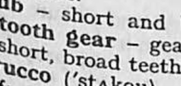
with slits in it. If the speed of the plate and (e.g.) of the revolving loop (as in the picture) are in the right relation, the eye will see the loop always in the same position; it will seem to stand still. (Other positions are blacked out by the spaces between the slits, and the eye carries one picture on to the next as in a cinema.) If a wheel so being examined is not really round, (or if the spokes are not set right), movement will be seen. Other forms (as for scientific work) use electric sparks (instead of a slitted plate) to light up the moving object.

'stroma ('stroumə) – the tissue which covers an organ, or forms its framework.

'strontium ('strɔntiəm) – white metal element similar to calcium; its hydroxide, $Sr(OH)_2$, is used in purifying sugar, and its salts for making red flames in fireworks. **strontium 90** – radioactive form of strontium produced in a nuclear ↓reactor. It is harmful to Man and forms a dangerous part of radioactive matter which might be scattered (e.g.) by an atomic bomb. ↓fall out. **'strontianite** – crystalline strontium carbonate as found in rocks.

'structure ('strʌktʃə) – something built; the way in which a thing is built, e.g. "molecular structure".

strut – beam which is compressed (i.e. pushed, not pulled) by the load; a slanting beam, e.g. in a roof.



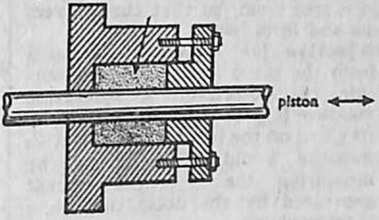
(ROOF) STRUT

'strychnine ('strikniin) – poison obtained from nux vomica; it causes great contraction of all the muscles.

stub – short and broad: e.g. **stub-tooth gear** – gear-wheel with very short, broad teeth.

'stucco ('stʌkou) – plaster on a surface, e.g. on the outside of a house; sometimes made to look as if the house was built of stone.

'stuffing box – container (filled with tightly packed material) used to prevent steam from coming out where the piston rod (e.g. of a steam-engine) passes through the end of the cylinder.



STUFFING BOX

'stupor ('stjuupə) – state of dullness of mind, as if only half awake, e.g. as a result of alcohol.

sty, stye – infection of an oil-gland in the eyelid causing a small painful swelling.

style (stail) – (1) stone post, pillar without a top or bottom piece; pillar; (2) in a flower, thread-like stem from the ovary (in which seeds are formed) to the stigma (on which the pollen falls). For picture see pistil.

stylo-/, styloid – shaped like a post or pillar.

'stylobate – continuous base of a line of pillars.

'stylus ('stailəs) – cutting point as used for writing or scratching designs on a surface.

'styptics ('stiptiks) – substances used to stop bleeding, e.g. adrenalin, iron perchloride, alum; also called ↓ haemostatics.

'styrene ('stairiin) – liquid ($C_6H_5 \cdot CH:CH_2$) made from benzene + ethylene; used to make ↓Buna S (artificial) rubber. **polystyrene** – polymerized styrene, molecules of styrene joined together in long chains so as to form a plastic, used in electrical instruments and lenses.

sub-/ (sʌb) – (1) under, below, e.g. **'sub'normal** – below average; (2) not quite, not very, e.g. **'suba'cute illness** – rather serious illness.

'suber-/ ('sjuubə-) – of cork (tree bark, e.g. of which bottle stoppers are made). **'suberin** – waxy substance in the outer (cork) layer of a plant; it prevents loss of water from the plant; it also prevents water and food from reaching the outer layers of a tree stem (so that these layers die and form bark).

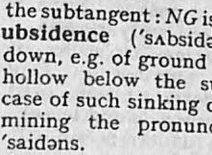
sub'jective (sʌb'dʒektiv) – coming from the mind itself, not seen outside (= objective): a subjective measure (e.g. of noise) is made from its effect on the listener; an objective measure would be made e.g. by measuring the electrical current generated by the noise through a ↓microphone.

'sublimate ('sʌblimeit) – (1) change a solid (e.g. ammonium chloride) into a vapour and then back into a solid, as a way of purifying it; (2) use the energy of a lower desire (e.g. sex) in a higher form of activity – e.g. in writing poetry, art, work for others.

sub'liminal (sʌb'liminəl) – below the limit of what one consciously feels or senses.

'sublu'xation ('sʌblʌk'seiʃən) – A joint (e.g. of the arm) is dislocated when one bone is pulled out of the hollow in another bone into which it fits; in subluxation the joint is only partly dislocated; the bone is not quite pulled out of place.

'sub'normal ('sʌb'nɔɔməl) (maths) – P is a point on the curve AB. TT^1 is the tangent (touching line) at P; PG is the normal (at right angles) to the tangent: TN is the subtangent: NG is the subnormal.



SUBNORMAL

'subsidence ('sʌbsidəns) – sinking down, e.g. of ground which is soft or hollow below the surface. In the case of such sinking caused by (coal) mining the pronunciation is səb-'saidəns.

'subsoil – coarse earth below the soil but above the hard rock. **subsoil water** – water below the surface of the ground but above the main rock or clay on which the upper soil rests.

sub'sonic (sʌb'sɔnik) – slower than the speed of sound.

'sub'standard stock ('sʌb'stændəd) – cinema film smaller than 35 millimetres width.

'substantive dyes ('sʌbstəntiv) – dyes which can be used for cotton materials without a mordant (substance to make a dye stick).

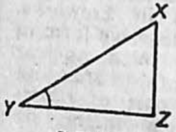
'substitute ('sʌbstitjuut) – to put one thing in place of another; put some other element (or ↓radical) in place of a hydrogen (or other) atom in a molecule; noun – thing so put.

'substrate ('sʌbstreit) – substance which is acted on by an ↓enzyme; substance (e.g. meat juice, gelatin) on which bacteria, fungi, etc., are grown.

'subs'tratum ('sʌbs'treitəm) – sunken layer, substance lying underneath, e.g. a substratum of rock under the soil.

'sub'tangent – ↓subnormal.

sub'tend (sʌb'tend) – e.g. the side XZ of the triangle subtends the angle Y, = is opposite to the angle.



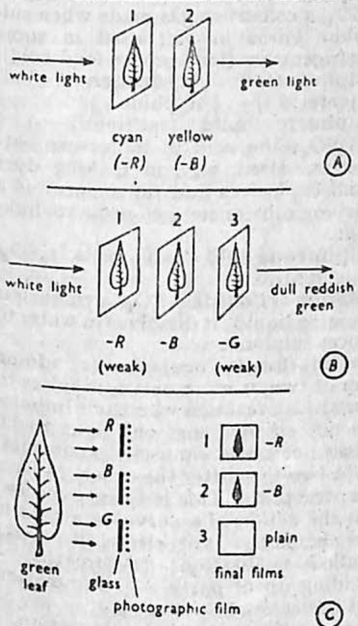
SUBTEND

sub'tractive colours (səb'træktiv) – A green leaf is green in ordinary white light because its colouring matter subtracts (takes away) from the white light all colours except green: green light only is reflected. The colours of ordinary things, dyes, paints, etc., are made by such a process of subtraction.

sub'tractive 'colour process –

1. Cyan (greenish-blue) = white light with red removed. Called Minus red.
2. Yellow = white light with blue removed. Called Minus blue.
3. Magenta (blue-red) = white light with green removed. Called Minus green.

(I) In making a coloured picture in a cinema of, e.g. a green leaf, we want green light only to reach the proper place on the screen. We shine white light through Film 1 which has a leaf picture in Minus red and through Film 2 which has a leaf picture in Minus blue. (Diagram *A*.) Film 1 takes away red light from the white; Film 2 takes away blue light, so that only green light reaches the screen. If the leaf is reddish-green, Film 1 is



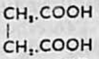
SUBTRACTIVE COLOUR PROCESS

made weak so that it does not take away all the red. If the leaf is a dull reddish green we should also use a weak film 3 (Minus green) to take away some of the green. (Diagram *B*.) By the use of 3 films, with the right strengths of the three Minus colours, we can get any colour we wish on the screen.

The films are made by using three photographic films (separately or together; ↓ bipack). One film, behind red glass, is affected only by red light, one behind green glass by green light, one behind blue glass by blue light. Where light comes through the coloured glass the film is treated so that it becomes transparent; where light does not come through the coloured glass the film is treated so that it has the Minus colour corresponding to the glass. Diagram *C* shows how 3 films are made in the case of a green leaf. ↓ bipack, tripack.

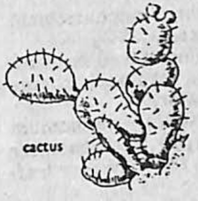
(II) In making a coloured picture on paper the same ideas are used, but we print in the 3 minus colours instead of passing white light through films of the 3 minus colours.

suc'cinic 'acid (sʌk'sinik) – acid found in mosses, roots (e.g. sugar-beet), formed in the fermentation of sugar by yeast, and in the breaking down of sugar in the body: used in manufacturing plastic substances for paints.


$\begin{array}{l}CH_2.COOH\\ |\\ CH_2.COOH\end{array}$

SUCCINIC ACID

'succulent ('sʌkjulənt) (plants) – soft and thick, juicy, e.g. the leaves or stems of a cactus.



SUCCULENT

'succus ('sʌkəs) – juice, e.g. of a plant.

'sucker – underground outgrowth from the root of a plant: organ of animal used for sucking.

'sucrose ('sjuukrous) – cane sugar, beet sugar (as ordinarily used).

'suction ('sʌkʃən) – sucking, drawing in liquid (or gas), e.g. the **suction stroke** of a pump.

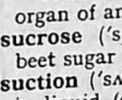
sud-/ (sjuud-) – sweat, e.g. **'sudo'rific** – causing sweat.

su'ffused (sə'fjuuzd) – (e.g. colour), spread out under the surface, e.g. "face suffused with blood".

'sugar of 'lead – lead acetate.

'sulcus ('sʌlkəs) – a groove, a low line between two raised surfaces, e.g. **'sulci** (-kai) of the brain.

'sullage ('sʌlidʒ) – mud deposited by a stream.



SULPHANILAMIDE

'sulpha drugs, sul'phonamides (sʌl'fɔnəmaidz) – a group of drugs which are able to destroy bacteria inside the body. The first sulpha drug was Prontosil, discovered in 1932; its activity was due to the substance **sulphanilamide** which formed a part of it. They are effective against various bacteria (but not staphylococcus and tubercle); probably do not kill the bacteria in the body but prevent multiplication so that the body can destroy them. Some cause headache, vomiting, fever. Examples: (1) **Sulphamerazine** – long-lasting in the blood, but liable to cause crystals in the kidneys; (2) **Sulphamethazine** – also long-lasting, and one of the safest; (3) **Sulphadiazine** – specially effective in the ↓cerebrospinal fluid; (4) **Sulphacetamide** – very soluble; (5) **Sulphaguanidine, -suxidine, -phthalidine** – used for infections of the bowel. **Sulphatriad** – a mixture of (1), (3) and (4) to prevent crystal-formation in the kidneys. (Trade names.)

'sulphates – salts of ↓sulphuric acid e.g. copper sulphate, $CuSO_4$.

sul'phation – forming of lead sulphate on the plates of a lead-acid storage battery (accumulator).

sulphate of a'mmonia – ammonium sulphate ($(NH_4)_2SO_4$) – fertilizer used especially to increase leaf-growth.

'sulphides ('sʌlfaidz) – compounds of sulphur with (usually) a metal, e.g. iron sulphide FeS; the black marks made by sulphur on silver are of silver sulphide. H_2S, hydrogen sulphide (sulphuretted hydrogen), is a gas with a very unpleasant smell.

'sulphites ('sʌlfaits) – salts of sulphurous acid, H_2SO_3. **sulphite wood pulp** – substance used for paper-making; powdered wood is made into pulp (soft mass) by soaking it with calcium bisulphite.

'sulpho'cyanide ('sʌlfo'saiənaid) – ↓thiocyanate.

'sulphonal ('sʌlfənæl) – slow-acting sleep-producing drug made from ethyl ↓mercaptan and ↓acetone.

sul'phonamides – = ↓sulpha drugs.

'sulpho'nation ('sʌlfɔ'neiʃən) – making sulphonic acids ($-SO_2OH$); e.g. heating a mixture of strong sulphuric acid and benzene gives benzene sulphonic acid, $C_6H_5.SO_2.OH$.

'sulphones ('sʌlfounz) – sulphur compounds some of which (e.g. sulphetrone, dissone) are used as drugs to cure ↓leprosy.

'sulphur ('sʌlfə) – non-metallic chemical element commonly met in the form of a yellow powder (flowers of sulphur).

'sulphur di'oxide (- dai'ɔksaid) – SO_2, a colourless gas made when sulphur burns in air; used in some refrigerators (for keeping food cold).

'sulphuretted 'hydrogen ('sʌlfjuəretid -) – ↓sulphide.

sul'phuric 'acid (sʌl'fjuərik -) – H_2SO_4; the acid in motor-car batteries. Used, e.g., in making dyes and explosives and (in science) as a drying substance. ↓co-ordinate linkage.

'sulphurous acid ('sʌlfiurəs) – H_2SO_3. ↓sulphites.

'sulphur tri'oxide – SO_3, a colourless fuming liquid; it dissolves in water to form sulphuric acid.

sum'mation (sʌ'meiʃən) – (1) adding up of two or more nerve impulses to produce a reaction where one impulse is not enough; e.g. one light touch does not cause a muscle to contract, but two (one after the other) cause a contraction. (This is to be expected as the action of a nerve on a muscle is chemical – not electrical.) Also called facilitation; (2) (maths) – adding up of parts, e.g. summation of the series $1 + 2 + 3 + 4 + \cdots 50$. ↓definite integral, integration.

sump – hole at the end of a ditch into which water flows from the ditch, so keeping the ditch dry; lower part of the case of a motor-car engine in which oil collects; this acts as a store of oil to be used again and again.

'sunspot – area on the surface of the sun which seems darker than the rest.

super-/ ('sjuupə-) – (1) above, e.g. **'super'posed** – put above or on top of; (2) more, more than usual, more than a certain amount, e.g. ↓ **'super'heated.**

'super'calendered paper (-'kælindəd) – very highly polished paper as used (e.g.) for printing coloured pictures.

'super'charger – a blower or pump which drives the vapour into a petrol engine under pressure, e.g. in aeroplanes flying very high up where the atmosphere is thin; also in racing motor-cars.

'super-'conduc'tivity – state in which substances conduct electricity very easily, i.e. they have practically no resistance; e.g. 1,000 miles of lead wire at 5° ↓absolute temperature has about the same electrical resistance as 1 inch of copper wire at ordinary room-temperature.

'super-'ego (- 'egou) – the idea of ourselves as we would like to be, as a preventer of bad actions and cause of good actions, e.g. "That sort of thing isn't done: *I* do not do that sort of thing": here I = the super-ego.

'Super-e'mitron – ↓Emitron.

'superflu'idity ('sjuupəfluu'iditi) – state of very easy flow, e.g. liquid helium flows up the walls of its container.

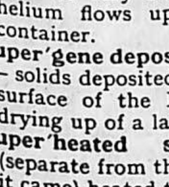
'super'gene deposits ('sjuupə'dʒiin -) – solids deposited from water on the surface of the Earth, e.g. by the drying up of a lake.

'super'heated steam – steam (separate from the water from which it came) heated to a higher temperature.

super'het, 'super'heterodyne (-'hetərodain) – ↓supersonic heterodyne.

'superim'posed – put down on, over, e.g. the paper is superimposed on the type when printing on a flat printing press.

su'perior (sju'piəriə) – higher, better, **superior planet**– planet further from the sun than the Earth is. **superior ovary** – ovary (in which seeds are formed) set on the top of the flower stem higher than the petals.



SUPERIOR OVARY

'super'natant liquid (fluid) (-'neitənt -) – the liquid above a solid which has separated out from the liquid and gone to the bottom of the container, e.g. in making tea or coffee you pour off the supernatant liquid.

super'nova (-'nouvə) – First see nova. In a supernova the temperature inside becomes very high before the star has time to behave as a nova; atoms are broken up inside the star and neutrons set free; these join with helium atoms to make heavy elements (e.g. iron). The star contracts, rotates very rapidly, and then explodes. Possibly the Earth and planets were produced in this way.

'super'numerary (-'njuumərəri) – more than the usual number, e.g. a sixth finger.

'super'phosphate – calcium phosphate treated with sulphuric acid, used as a fertilizer especially to encourage root growth.

'superpoly'amide (-pɔli'æmaid) – ↓nylon (plastic used e.g. for ladies' stockings, etc.).

'super'saturated so'lution (-'sætjuəreitid) – A saturated solution is one in which the liquid has as much dissolved substance as, ordinarily, it can hold at that temperature. A supersaturated solution is an unstable (unsteady) one which, under unusual conditions, holds more than this amount of substance.

'super'sonic ('sjupə'sɔnik) – faster than the speed of sound, e.g. flight of aeroplane. (For vibrations the word ↓ultrasonic is preferred.)

supersonic frequency – frequency, e.g. of an alternating electric current, which corresponds to a sound too high to be heard; a supersonic frequency is usually understood to be less than a ↓radio frequency and so is sometimes called an **intermediate frequency**.

'super'sonic 'heterodyne re'ceiver ('hetərodain) – Radio waves and the currents which they set up in a radio receiver have very high frequencies (e.g. 1,000,000 cycles per second). In a **superhet** (= supersonic heterodyne) receiver these currents are mixed with currents made by the receiver itself so as to produce currents of a chosen supersonic frequency (usually 100,000–450,000 cycles per second) (↓heterodyne). These currents are then strengthened, etc., and the currents representing the sound taken from them. The advantage is that it is possible to make a better receiver to deal with one supersonic frequency than with various frequencies of radio-broadcasting stations.

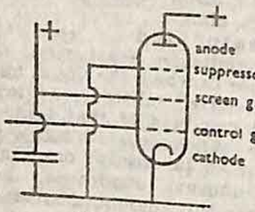
'supi'nation ('sjuupi'neiʃən) – turning the hand so that the soft inner side (the palm) is upwards.

'supine ('sjuupain) – lying down on one's back.

su'ppository (sə'pɔzitəri) – a small mass of medicine (e.g. dissolved in easily melted wax) to be put into the bowel or ↓ vagina.

su'ppression of urine (sə'preʃən) – failure of the kidneys to form urine.

su'ppressor grid (sə'presə -) – the grid (net-like ↓ electrode) nearest the anode (positive plate) in a 5-electrode radio valve. When electrons strike the anode they cause other electrons to come out from the anode (↓ secondary emission). The purpose of the suppressor grid is to prevent these (secondary) electrons from reaching other electrodes in the valve.



SUPPRESSOR GRID

'suppurate ('sʌpjuəreit) – form pus (yellow liquid made of dead bacteria and dead blood-cells from a wound).

'supra – ('sjuuprə) – above, upon, e.g. **'supra'orbital** – above the orbit (bony hollow in which the eye is set).

'supra'renal glands (-'riinəl) – glands above the kidney; also called adrenal bodies. The inner part produces ↓ adrenalin; the outer part (the cortex) produces substances which control the use of salt and of carbohydrates (sugar, starch) by the body. ↓ corticosterone.

'Suramin ('sjurəmin) – = Germanin = Bayer 205 – drug used for ↓ sleeping sickness: it does not enter the nervous system so is unable to cure later stages of the disease, but is useful in the early stages, and as a protection: (trade names).

surd (səəd) – a square root (e.g. $\sqrt{5}$, $\sqrt{11}$) which cannot be exactly expressed however many decimal figures are taken.

'surface 'tension (- 'tenʃən) – The molecules in a liquid are pulled by other molecules from the sides, from below and from above: but the molecules on the surface have no pull from above. So these surface-molecules try to move inwards, away from the surface. This inward-pull makes the surface become as small as possible. This tendency to make a small surface has a result as if a thin skin covered the liquid, e.g. a needle, laid carefully on the top of a glass of water, is held up by the surface tension skin.

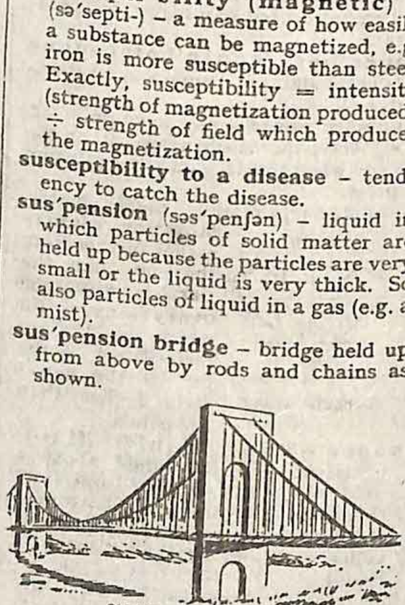
'surging ('səədʒiŋ) – to-and-fro movement of the water as waves break on the land: to-and-fro movement of an electric current.

su'scepti'bility (magnetic) – (sə'septi-) – a measure of how easily a substance can be magnetized, e.g. iron is more susceptible than steel. Exactly, susceptibility = intensity (strength of magnetization produced) ÷ strength of field which produces the magnetization.

susceptibility to a disease – tendency to catch the disease.

sus'pension (səs'penʃən) – liquid in which particles of solid matter are held up because the particles are very small or the liquid is very thick. So also particles of liquid in a gas (e.g. a mist).

sus'pension bridge – bridge held up from above by rods and chains as shown.

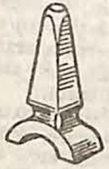


SUSPENSION BRIDGE

'suture ('sjuutʃə) – ("sewing"): (1) sewing up of a wound; (2) line between bones where they are joined in such a way as to show a mark as if they were sewn together, e.g. the bones of the skull.

swab (swɔb) – small piece of cotton-wool used, e.g., for taking substances from the throat so as to examine them for bacteria.

swage (sweidʒ) – (1) to press or hammer a piece of cold metal so as to shape it; (2) instrument put on to a piece of metal and hammered so as to shape the metal, e.g. to make a bar smaller in diameter. **swage block** – block put into a hole in an anvil to hold a swage.


SWAGE

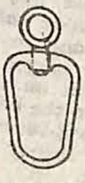
swarf (swɔɔf) – thin piece of metal cut off when using a lathe (compare shavings of wood-lathe work).

'sweated joint ('swetid) – joint made by covering the ends of two pieces of metal with tin and heating them while they are pressed together.

swine fever – infectious disease of pigs, due to a ↓ virus causing inflammation of the stomach and lower bowel.

switch – (1) (railway) – e.g. switch a train on to another line = set the points (rails) so that a train goes on to another line; (2) instrument for turning electric current on or off.

'swivel (swivl) – joint, e.g. on the end of a watch-chain, so made that it can turn round.


SWIVEL

sylv-/ (silv-) – of a forest. **syl'vestral (plants)** – which grow in forests.

'sylvite ('silvait) – natural potassium chloride, from which potassium compounds are made.

sym-/, syn-/ – together, in company with.

'symbi'osis ('simbai'ousis) – two different plants or animals living together and joining on to each other, each being useful to the other, e.g. bacteria on the roots of pea and bean plants; so also organisms in the bowel of white ants (termites) which enable them to digest cellulose (wood fibre).

'symbol ('simbəl) – a sign, written character which represents (stands for) something else. **Chemical symbols**, e.g. C = an atom of carbon. (For a full table of chemical elements, see p. 411.) **mathematical symbols** – ×, ÷, +, −, √, etc.

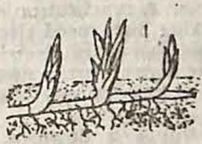
sy'mmetrical (si'metrikəl) – balanced, the same on both sides or on all sides of an axis, e.g. a person's face. (If one side of the face is larger than the other, the face is **asymmetrical**.) **asymmetrical carbon atom** – ↓ stereo-isomerism.

sympa'thetic nervous system (simpə'θetik - -) – a scattered collection of grey nerve matter joined by a network of nerves close in front of the upper and lower parts of the spine (on the inner side). It is part of the autonomic (self-acting, automatic) nervous system; its chief work is to enable the body to deal with the needs of the moment, to take strong action at once, e.g. in danger and excitement. The ↓ parasympathetic system is the other part of the autonomic nervous system; it deals rather with the upkeep of the body and future needs.

sym'petalous (sim'petələs) – having flower-petals joined together, e.g. primrose, potato.

sym'physis (sim'faisis) – a joining together of bones in the middle line of the body.

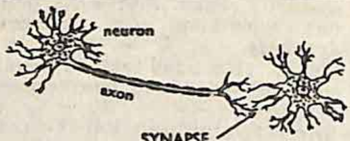
sym'podium (sim'poudiəm) – plant stem formed by the repeated growth of side buds (not by the growth of the bud on the end of the stem) as in plants which grow along underground and send up shoots.


SYMPODIUM

'symptom ('simptəm) – Signs and symptoms: the symptoms are feelings of illness as described by the sufferer, e.g. discomfort, headache: the signs are what the doctor measures by instruments or finds by tests, e.g. temperature, pulse.

syn-/ – sym-/.

sy'napse, sy'napsis (- si'næpsis) – joining together of one nerve with



SYNAPSE

another so that a nerve-impulse can pass.

'synchro-/ ('siŋkrou-) – ("together time"): at the same time, in time with each other, e.g. **'synchronize** – to cause two things to happen (act, etc.) at the same time. **sync signals** – radio impulses which cause the beam of a television receiving set to start a new line on the screen; so also for starting a new frame (= picture-square). ↓ television, saw-tooth, thyratron.

'sync(h)romesh gear – system of gear wheels in which the two wheels which are to engage each other are automatically made to turn at the same speed before doing so.

'synchronize ('siŋkrənaiz) – ↓ synchro-/.

'synchrotron ('siŋkrotrɔn) – In machines for producing high-speed electric particles (e.g. ↓ betatron) the mass of the particle increases with speed so that in time the impulse of the machine gets out of step with the movement of the particle. By the use of alternating electric forces whose frequency changes, this difficulty is overcome. A synchrotron is a betatron (making high-speed electrons) which has this extra electric force. A similar instrument is used for accelerating heavier particles (e.g. protons).

'syncline ('siŋklain) – a downward curve in layers (strata) of rocks. ↓ geosyncline.

'syncope ('siŋkəpi) – fainting, sudden loss of consciousness.

'syndrome ('sindroum) – a group of symptoms (signs, feelings) of illness which, together, point to a certain disorder of the body: e.g. Stokes-Adams syndrome = slow pulse + attacks of unconsciousness – a sign of blocking of the valve between the upper and lower part of the heart (auricle and ventricle).

sy'nergidae (si'nəədʒidii) – two cells near the entrance to an ovule (unfertilized seed) which seem to help in guiding the tube from the pollen grain (male cell) to the nucleus of the ovule.

'synergism ('sinəədʒism) – the working together of two drugs, e.g. of sulphonamide + penicillin.

sy'nodic month (si'nɔdik-) – 29·53 days, time between a certain state of the moon (e.g. full, half, etc.) and the reappearance of that state.

syn'optic chart (sin'ɔptik -) – map on which are shown air pressure, temperature, amount of cloud, etc., at various places at a certain time; used in weather-forecasting.

sy'novial membrane (sai'nouviəl) – smooth membrane between the two parts of a joint (e.g. the knee); it produces **synovia** – a liquid which acts like oil and makes the joint move smoothly. **'syno'vitis** – inflammation of the synovial membrane.

'synthesis ('sinθisis) – the building up of a complex substance from elements or from simpler substances, e.g. synthesis of starch by a plant, of artificial rubber by a chemist.

syn'thetic (substance) (sin'θetik -) – substance "put together" by the chemist, not made by nature; e.g. synthetic rubber.

'syphilis ('sifilis) – a disease, due to the ↓ spirochaete (*Treponema pallidum*). It is passed from one sex to the other. In the early stages it causes swellings and sores on the surface of the body, but in the later stages attacks the blood-vessels, heart, brain, spinal cord. It may be passed on to the offspring.

sy'ring-/-o-/ (si'riŋg-) – like a pipe; used of diseases causing pipe-like cavities, e.g. **sy'ringomy'elia** – such a disease of the central canal of the spinal cord (= *myel-/*). ↓ syrinx.

'syringe ('sirindʒ) – instrument used

SYRINGE

for pushing out a liquid with force from a small hole: the picture shows an ear-syringe.

'syrinx ('siriŋks) – ("pipe or tube"): the voice-producing organ of a bird: a pipe-like (diseased) opening in the body. ↓syringo-/.

'system – a group of things which work together, which are joined into a whole, e.g. the solar system (sun and planets); the nervous system (brain, spinal cord, nerves).

'syste'matics ('ʒisti'mætiks) – scientific arrangement of living things in orders, families, classes.

sys'temic (sis'temik) – of the whole body, e.g. **systemic infection** – infection which spreads through the whole body, and (e.g. in a plant) goes into the new growing parts.

'systole ('sistəli) – the regular contraction of the heart: (diastole = regular expansion of the heart).

'syzygy ('sizidʒi) – The moon is in syzygy when it, the Earth, and the sun are in a straight line (e.g. at full moon or new moon).

T

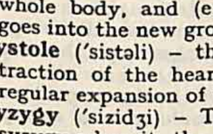
T.B. – ↓tuberculosis.

T.N.T. – ↓trinitrotoluene.

Tϕ – ↓tephigram.

Ta – chemical sign for ↓tantalum.

tab – hinged part of the back edge of an aeroplane wing used e.g. to trim the aeroplane (make it level in the air).



TAB

'tabby-weave – plain weave – over one thread, under the next, etc.

'tabes ('teibiiz) – old word for any disease causing wasting away. **'tabes dor'salis** – ↓locomotor ataxia (disease of the spinal cord causing difficulty in making the muscles act together, e.g. in walking): adjs. **ta'bescent, ta'betic.**

'tache'ometer ('tæki'ɔmitə), **ta'chymeter** (tæ'ki-/) – instrument for making quick measurements of distance in map-making; e.g. a post of known length is looked at through a telescope with cross hairs between its lenses. Calculation from the length of post seen between the hairs gives the distance. See diagram below.

tach-/, tachy-/ – rapid, e.g. **ta'chometer** – instrument which counts the number of revolutions per minute of an engine. **'tachy'cardia** – rapid heart-beat.

tack, tin-tack – small pointed nail, (not wire nail), with a large head.

tackle (tækl) – e.g. **block and tackle** = pulley and rope.

'tacky ('tæki) – sticky so that threads of glue are pulled up on the finger if it is touched.

'tactile ('tæktail) – of touch.

'taenia ('tiiniə) – (1) thing shaped like tape – long, narrow and flat; (2) tapeworm (long flat parasitic worm in the bowel).

'taffeta ('tæfitə) – stiff *plain-woven silk (cotton or wool) *(over one thread, under one thread).

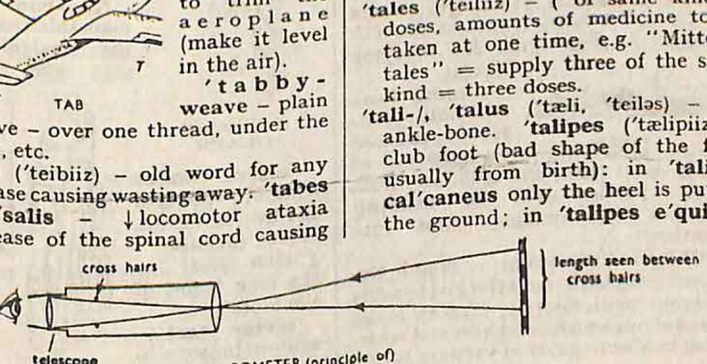
'tailings ('teiliŋz) – waste matter, e.g. from a mine.

'tail-race – channel carrying water away from a machine driven by water-power.

talc (tælk) – soft stone from which face-powder is made. ↓steatite.

'tales ('teiliiz) – ("of same kind"): doses, amounts of medicine to be taken at one time, e.g. "Mitte iii tales" = supply three of the same kind = three doses.

'tali-/, 'talus ('tæli, 'teiləs) – the ankle-bone. **'talipes** ('tælipiiz) – club foot (bad shape of the foot, usually from birth): in **'talipes cal'caneus** only the heel is put on the ground; in **'talipes e'quinus**



TACHEOMETER (principle of)

only the front of the foot; in **'talipes 'varus** only the outer edge; in **'talipes 'valgus** only the inside edge.

'tambour ('tæmbuə) – ("drum"): any drum-shaped thing, e.g. a very short pillar.

tamp – strike with slow steady blows so as to press down, e.g., stones in road-making.

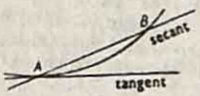
'tampon ('tæmpɔn) – a small mass of cotton-wool (with a thread on it to pull it out) put into a cavity of the body, e.g. to stop bleeding or to carry a healing drug.

tan – ↓tangent of an angle.

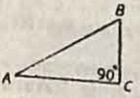
'tandem, in – ('tændəm) – two things working one behind the other, e.g. horses one behind the other pulling a cart; bicycle for two riders, one behind the other.

tang – the part of a steel tool which is inside the wooden handle.

'tangent ('tændʒənt) – line touching a curve at a point without crossing it; more exactly (see diagram) the limiting (furthest possible) position of the line *AB* as *B* comes nearer and nearer to *A* along the curve. **tan'gential** – in the position or direction of a tangent.



TANGENT (1)



TANGENT (2)

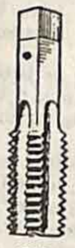
'tangent of an angle – e.g. of the angle *A* (**tan** *A*), the length of side *BC* divided by the length of side *AC*.

'tanker – ship built for carrying liquids.

TANKER

'tannin, 'tannic 'acid – substance produced from the bark of (e.g. oak-) trees, and especially from oak ↓galls, used for **tanning** leather (= making skins into leather).

tantalum ('tæntələm) – metal element; very hard; not attacked by acids (except hydrofluoric); used to make hard alloys which resist heat and acids; also to absorb gases in vacuum tubes.

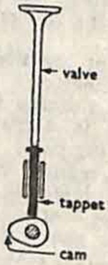


TAP

tap (engineering) – instrument used for cutting a screw-thread (spiral cut) inside a hole. ↓tapping.

'tapered (rod) ('teipəd -) – (rod) made gradually smaller towards one end, e.g. the end of a sharpened pencil is tapered towards the point.

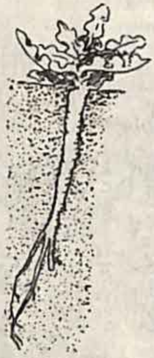
'tapeworm – flat parasitic worm in the bowel. ↓taenia.



TAPPET

'tappet – bar moving in a tube or bearing, used in changing circular into straight movement; e.g. to work a valve in a petrol engine: as the cam turns toward the right it pushes up the tappet (which works the valve). Without a tappet the cam would give a side push on the valve stem.

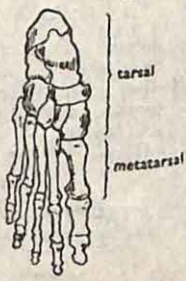
'tapping – (1) drawing off liquid from a container, or the body, e.g. in ↓ dropsy. **tapping a telephone wire** – leading off some electricity so as to listen in to what people are saying; (2) cutting a screw thread inside a hole with a ↓tap.



dandelion with TAP-ROOT

'tap-root – long main thick root growing straight down into the ground.

'tarsal bones ('taasəl-) – bones of the foot as shown.



TARSAL BONES

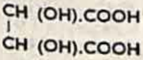
'meta'tarsals – ("after tarsal") – the long bones of the foot.

'tartar ('taatə) – white or brown substance deposited on the teeth by the saliva (liquid of the mouth); it consists mainly of phosphate of lime.

'tartar, cream of – acid potassium tartrate, used as a medicine to cause action of the bowel and increase the flow of urine; it is deposited in wine barrels during the process of making wine.

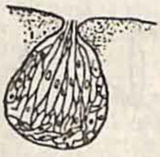
'tartar e'metic (- i'metik) – tartrate of potassium and antimony, used as a medicine for coughs and colds; also for ↓ bilharzia: in large amounts it is poisonous.

tar'taric acid (taa'tærik) – the acid of grapes, found in four forms; two of them have an effect on ↓ polarized light: used in making effervescent drinks (with bubbles) and for its acid taste. ↓ racemic, meso-. **'tartrates** - salts of tartaric acid.



$$\begin{array}{l}\mathrm{CH\,(OH).COOH}\\ |\\ \mathrm{CH\,(OH).COOH}\end{array}$$

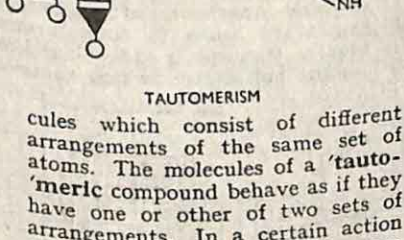
TARTARIC ACID



TASTE-BUD

taste-bud – The taste-nerve in the tongue has special cells at the end; these special cells together with the nerve endings are the taste-buds.

tau'tomerism (tɔɔ'tɔmərizm) – Isomers are molecules which consist of different arrangements of the same set of atoms. The molecules of a **'tauto'meric** compound behave as if they have one or other of two sets of arrangements. In a certain action the compound behaves as one arrangement, e.g. A: in another action the compound behaves as another arrangement, e.g. B. This effect is called tautomerism.



TAUTOMERISM

'taxi-ing (aeroplane) – moving along on the ground by means of its own engines.

/-taxis ('tæksis) – movement of an organism (animal, whole plant) as a response to a stimulus, e.g. **photo-taxis** – response of an organism to light.

ta'xonomy (tæk'sɔnəmi) – the science of arranging plants and animals in classes.

Te – chemical sign for ↓ tellurium.

'teasing ('tiiziŋ) – straightening out the fibres, e.g. on the surface of a cloth; taking out faults from a varnished surface.

'tebilising ('tebilaiziŋ) – treating cotton and artificial silk fibres with ↓ urea-formaldehyde plastic so that the plastic goes inside the body of the fibre: the process prevents creasing (folding marks and wrinkles): (trade name).

'Technicolor ('tekni-) – system of making coloured cinematograph films: ↓ subtractive, bipack: (trade name).

tech'nology (tek'nɔlədʒi) – the use of science in manufacturing things.

tect-/ – roof; e.g. **'tec'torial**, adj. – like a roof. **tectum** – roof-like part e.g. of the body.

tedding – turning over and spreading cut grass so as to dry it into hay.

'Teflon – ↓ polytetrafluoroethylene.

'tegmen-/, 'tegumen ('tegjumen) – cover, protection, outer surface, e.g. **teg'mentum, in'tegument.**

te'langi'ectasis (te'lændʒi'ektəsis) – small red spots on the skin (especially of old people) caused by dilation (widening) of the small blood-vessels.

tele-/ ('teli-) – far, e.g. **'telephone, 'telegraph.**

te'legony (te'legəni) – A female has offspring with male, *X*, as father; then with *Y* as father. Telegony = the supposed (but unproved) effect of *X* on the *Y* offspring.

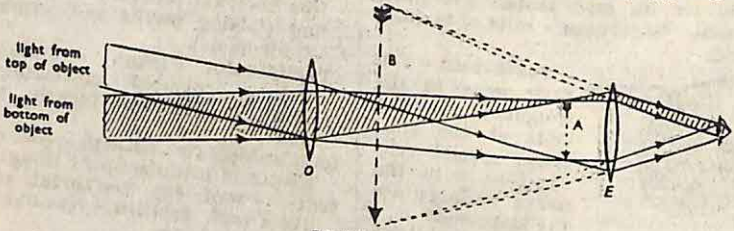
te'lemetry (te'lemitri) – the sending of messages over a distance (e.g. from rockets, aircraft. ↓ sonde) to report the measurements made by instruments.

'tele'ology ('teli'ɔlədʒi) – (*tele(o)-/* = end) – the study of the end and purpose of things, e.g. as a part of philosophy and religion; explanation of the way in which the bodies of animals (plants) are built, and of the shapes and sizes of organs, etc., by thinking of their use and purpose.

'tele'photo lens ('teli'foutou -) – telescopic lens for taking photographs of distant things making them show as if near.

'teleprinter, 'telotype – machine on which messages are struck as a typewriter: each letter is represented by 5 signs (as in the ↓ Baudot code) and the receiver (at any distance) changes these signs into printed letters: (trade name).

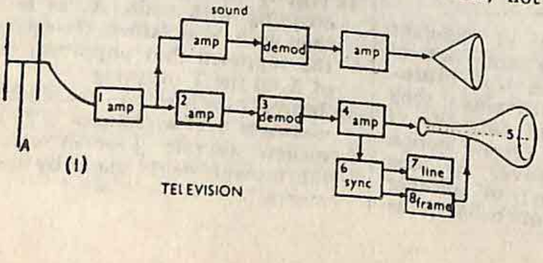
'telescope ('teliskoup) – instrument used for seeing distant things. The drawing shows an astronomical telescope. Light from a distant object passes through the object-glass, *O*, and forms an image, *A*. This image is seen through the eye-piece (lens), *E*, which acts like a magnifying-glass, so that a big final image, *B*, is seen. The image is upside down, but in studying the sun, stars, etc., this does not matter. ↓ **Galileo's telescope** has a concave lens (lens thinner in the centre) for eye-piece and gives an image the right way up.



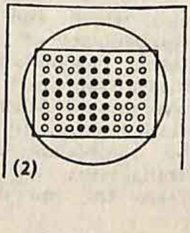
TELESCOPE

'tele'therapy ('teli'θerəpi) – the use of X-rays and ↓ gamma-rays for the treatment of disease. The rays are used in a narrow beam from a distance so that they can be directed on to the diseased part and not damage the surrounding tissue.

'television ('teli'viʒən) – sending and receiving pictures (with sound) by radio. (For sending see iconoscope.) See diagram: the incoming impulses from the aerial (*A*) are (1) amplified (strengthened), then split into sound-frequency and sight-frequency. Sound goes through a radio-set of the usual kind. The sight impulses are (2) amplified again; then (3) demodulated (changed so that they affect the instrument); (4) amplified. The impulses then pass into the tube (5) and affect a beam of electrons which make lines of bright or less bright spots on the end of the tube (as in Diagram (2)). At stage (4) the synchronizing impulses are split up: these (7) cause the beam in the tube to start a new line at the right moment. Another set of impulses (8) causes the beam to start a new square. (Between 4 and 5 there is a circuit, not shown, which controls



TELEVISION

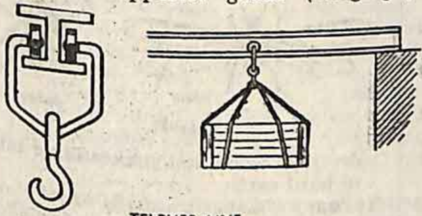


average brightness – so that a badly lit room and a brightly lit room do not look the same.)

te'llurium (te'ljuəriəm) – white metal element used in purifying zinc, and as an alloy with lead.

'telo-/ ('telo-) – end, purpose; e.g. **'telosy'napsis** (-si'næpsis) – a joining end to end. **telotype** – ↓ teleprinter.

'telpher line ('telfə) – single rail held up on supports: goods (hanging below) are carried along it on wheels running on the rail.



TELPHER LINE

'temper – the state of a metal (hard, springy, etc.) which results from ↓ tempering.

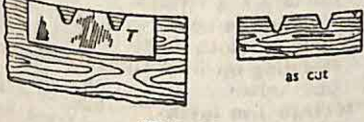
'tempera – colours mixed with white of egg or glue as used for painting pictures on walls.

'temperament – the general nature (quiet, excitable, etc.) of a man, as caused by his nervous system and ↓ endocrine glands.

'temperature – degree of hotness as measured by a thermometer. **temperature coe'fficient** – mathematical statement of the change in a quantity or property (e.g. speed of a chemical action, electrical resistance of a metal) with each degree of temperature.

'tempering – (1) causing metal to be hard, tough, springy, etc., by heating and cooling in a certain way; (2) mixing clays and water for moulding pottery.

'template, 'templet ('templət) – (1) piece of metal cut to the exact size and shape, used as a pattern to make several things exactly alike without measuring and drawing each one; compare the paper pattern of a dress; (2) long flat stone under the end of a beam.



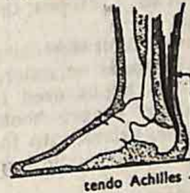
TEMPLATE

'temple – roller with sharp points or raised lines on it used to keep the already woven cloth stretched out sideways in the loom.

'tempor-/-o-/, 'temporal ('tempərəl) – of the **temple** (side of the head between the top of the ear and the eye), e.g. **temporal bone.**

temporary hardness (of water) – ↓ hardness of water (caused by dissolved bicarbonates) which can be removed by boiling.

'tendo, 'tendon ('tendou, 'tendən) – the strong fibrous band by which a muscle is fixed on to a bone. **tendo A'chilles** (æ'kiliiz) = **tendo cal'caneus** – the tendon fixing the muscle of the calf (at the back of the lower leg) to the heel-bone.

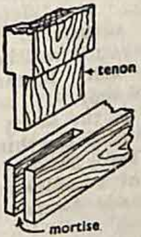


TENDO, TENDON

'tendril – the fine outgrowth by which a plant climbs.

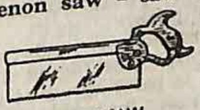
'tenia – = ↓ taenia.

'tenon ('tenən) – outstanding piece of wood which fits into a slot (mortise) in another piece of wood to make a joint.



TENON

'tenon saw – saw with a stiffening band on the back, used for making very straight cuts.



TENON SAW

tens-/ – pull. **'tensile strength** '(tensail -) – strength of a bar, wire, etc., to resist a pull which stretches it.

tensile test – test in which a bar, etc., is stretched by a gradually increasing load, to find out (a) with what loads its length increases in exact proportion to the load (↓ Hooke's law), (b) at what load it yields (slowly grows in length without increasing the load), (c) the greatest load it can hold without breaking.

'tension (1) ('tenʃən) – the force inside a pulled bar, wire, etc., e.g. the tension in the string round a parcel, etc.; (2) the word is sometimes used for electrical pressure (voltage), e.g. **high tension battery.**

tent – small mass of any material (which expands when wet) put into a cavity in the body so as to open it out gently and gradually.

'tentacle ('tentəkl) – a long easily bent organ used for touching or seizing, e.g. the tentacle of an ↓ octopus, the "horn" of a snail.

'tenter – a machine used for stretching cloth by means of hooks on rollers. **'tenterhooks** – (1) hooks used in stretching cloth; (2) square hooks sharp at both ends, driven into the top of a wall to prevent people from getting over.

'tephigram ('tefigræm) – **Tφ**: a diagram showing temperature, moisture, pressure, etc., at different heights above the surface of the Earth; used in forecasting weather.

ter-/ – three, e.g. ↓ tertiary, ternary.

'tera'tology ('terə'tɔlədʒi) – ("monster, fearful thing"): the study of very unusual forms of living things, e.g. in the case of Man, abnormally large men (giants), abnormally small men (dwarfs) Siamese twins (two joined together), etc.

'tera'toma – a cyst (= enclosed growth) containing tissue which belongs to some other part of the body, e.g. a cyst in the ↓ ovary containing skin, hair and teeth.

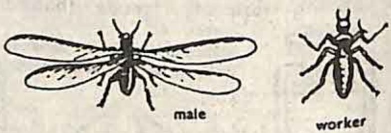
'terebene ('terəbiin) – substance rather like turpentine (liquid from trees as used in painting): used as a medicine and also for making paint more liquid.

'tergum ('təəgəm) – the back; adj. **tergal.**

term (mathematical) – e.g. $y = 3x + 16x^2$ is a statement which gives *y* **in terms of** *x*. The terms are $3x$ and $16x^2$. (3 and 16 are not terms; they are coefficients = multipliers.)

'terminal ('təəminəl) – end, at the end of. **terminals of a battery** – screws into which the ends of the wires are fixed. **terminal velocity** – greatest (steady) speed reached by a Body (e.g. a raindrop) when falling through the air.

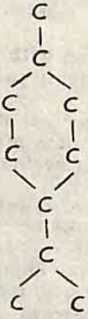
'termite ('təəmait) – "White ant"; creature which looks like an ant, destroys wood and makes large hills of hard earth.



TERMITE

'ternary ('təənəri) – made up of three parts, e.g. a ternary alloy = an alloy of three metals.

'terpenes ('təəpiinz) – sweet-smelling easily vaporized hydrocarbon oils found in many plants. Many are based on the arrangement of carbon atoms as shown. **ter'pineol** – an alcohol obtained from certain terpenes, used in making perfumes (especially for soaps).



TERPENE

terr-/ – Earth, e.g. **subter'ranean** – under (the surface of) the Earth. **ter'restrial** (tə'estriəl) – of the Earth, e.g. **terrestrial magnetism.**

'terra-'cotta ('terə-'kɔtə) – red pottery.

Terra'mycin ('terə'maisin) – ↓ antibiotic produced from a soil fungus (*Streptomyces rimosus*). Useful against various bacteria and some of the larger ↓ viruses.

ter'rigenous rocks – ↓ /-genous.

'terry – cloth with (uncut) loops standing up from the surface. ↓ cut pile, velvet.

'tertian ma laria ('təəʃiən -) – kind of malaria which causes fever every third day (= after every 48 hours). **malignant tertian** – a dangerous disease, not common in cooler countries, caused by the organism ↓ *Plasmodium falciparum*. **benign tertian** – the commoner form of malaria, caused by *Plasmodium vivax* (or, less often, *P. ovale*).

tertiary alcohols – **tertiary amines** – ↓ secondary.

Tertiary era – the ↓ Cainozoic ("recent life") era (age) (from about 55 million years ago to the present day) but excluding the Pleistocene ("fullest life") period (the last 1–2 million years) which is in the Quaternary (fourth) era. It consists of five parts – (1) Palaeocene (old); (2) Eocene (daybreak); (3) Oligocene (little); (4) Miocene (medium); (5) Pliocene (more).

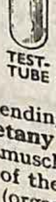
'Terylene – artificial fibre made from ethylene glycol and terephthalic acid. Very strong, easily washed, not harmed by sunlight or hot water. (trade name.)

'tesselated ('tesəleitid) – made up of **'tesserae, tessellae** (little squares of stone as used in an ornamental floor). Singular, a **tessera, tessella.**

'testa ('testə) – shell, e.g. outer coat of a seed; the outer coat of certain sea-creatures, e.g. sea-urchins.

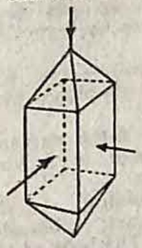
'testicles, 'testes ('testiklz, 'testiiz) – the two parts of the male sex organ which produce the male reproductive cells (spermatozoa).

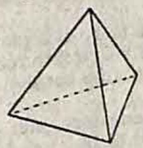
'test-tube – glass tube closed at the bottom as used in a chemical laboratory.


TEST-TUBE

te'tanic (te'tænik) – of or like **'tetanus** ('tetənəs) = lockjaw, disease caused by bacteria found in earth especially where there are droppings from the bowels of horses or cattle. The bacteria enter through a deep wound and attack the spinal cord. The disease causes great contractions of the muscles, often ending in death.

'tetany ('tetəni) – contraction of the muscles in one part of a small area of the body, e.g. hands, feet, larynx (organ of voice); due (e.g.) to lack of ionized calcium (calcium ions) in the blood.


TETRAGONAL

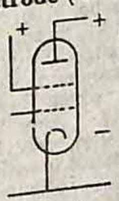

TETRAHEDRON

'tetra-/ – four. **'tetrad** ('tetræd) – group of 4, e.g. of 4 spores.

te'tragonal crystal system (te'trægənəl-) – A crystal of this shape has 3 axes (middle lines) at right angles; two of the axes are equal in length. If the crystal is turned about the third axis there are four positions (in one whole turn) in which the corners, edges and faces come into the same positions. Example: tin.

'tetra'hedron ('tetra'hiidrɔn) – a solid with four faces.

'tetrode ('tetroud) – (First see triode) – radio valve with four electrodes: (1) the *cathode* which sends out electrons; (2) the *grid* which controls their flow; (3) the *screen grid* which stops (2) from forming a condenser with (4); (4) the *anode* (+ plate). ↓ screen grid.



TETRODE

text-/ – weave, e.g. **'textiles** ('tekstailz) – woven materials, cloth. **'texture** – the size and arrangement of the parts of a thing, how it is "woven" or put together, e.g. in describing a rock; **graphic texture** – a mixture of crystals in a rock which looks like writing.

Th – chemical sign for ↓ thorium.

'thalamus ('θæləməs) – ("inner room"): (plants) – the enlarged top of a stem on to which the flower parts (petals, etc.) join. Also called receptacle.

thalamus, thalami – two large egg-shaped masses on the top end of the stem of the brain; impulses (messages) from the body pass through the thalamus to the cerebrum (upper, thinking and controlling layer of the brain). The thalamus is very important in the nervous control of higher animals such as man. For picture see hypothalamus.

tha'lass-/-o-/ (θæ'læs-) – sea, e.g. **tha'lassophyte** – sea-plant, seaweed.

'thallium ('θæliəm) – metal element, similar to lead, used in making special kinds of glass.

'Thallophyta ('θælofaitə) – the oldest group of plants; it includes ↓algae and fungi. The body of the plant is not clearly divided into root, stem, leaves.

'thallus ('θæləs) – the body of a plant which has no clear division into root, stem, and leaves; it may consist of one or many cells.

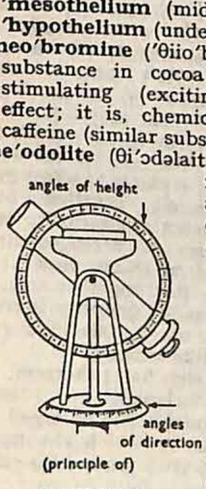
'theca ('θiikə) – a container, e.g. of spores in some kinds of fungi and of mosses.

'theine ('θii.in) – = ↓caffeine.

/-thelium (-θiiliəm) – layer of cells, e.g. **'epithelium** – layer of cells on a free surface of the body; so also **'mesothelium** (middle layer) and **'hypothelium** (under-layer).

'theo'bromine ('θiio'broumiin) – the substance in cocoa which has a stimulating (exciting, refreshing) effect; it is, chemically, very like caffeine (similar substance in coffee).

the'odolite (θi'ɔdəlait) – instrument for measuring angles (sideways or up and down) as used in map-making.



(principle of)

THEODOLITE

'theorem ('θiərəm) – statement which has to be proved by mathematics.

'theory ('θiəri) – a set of scientific ideas which agree with each other and with known facts, but has not been tested and proved true by experiment.

'thera'peutic ('θerə'pjuutik) – having to do with the cure of diseases. **/-therapy,** cure, e.g. **'radio'therapy** – cure of disease by rays (of light, heat, etc.); so also **'hydro'therapy** – by water and **'physio'therapy** – by massage (rubbing, special exercises, etc.).

therm (θəəm) – unit of heat used in the sale of gas for cooking, etc. = 100,000 British Thermal Units (B.Th.U.) = enough heat to boil about 56 gallons of ice-cold water.

therm-/-o-/ ('θəəmo-) – heat. **'thermal** – of heat. **thermal efficiency of an engine** – relation between work done and heat value of fuel (e.g. coal, oil) burned. **thermal capacity** (of a Body) – the amount of heat (e.g. number of *B.Th.U.) needed to raise the Body 1 degree (e.g. 1° F.) in temperature: *(see therm, above).

'thermel ('θəəmel) – instrument used to measure temperature by means of electricity. ↓thermocouple.

'thermi'onics ('θəəmi'ɔniks) – scientific study of the sending out of electrons by hot Bodies and (loosely) of how they act in e.g. radio valves; adj. – **thermionic,** e.g. **thermionic valve** = radio valve.

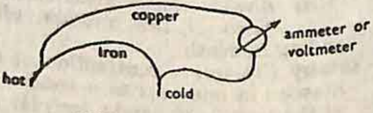
thermionic converter – apparatus for changing heat directly into electrical power by ↓thermionics.

'thermistor ('θəəmistə) – instrument whose electrical resistance decreases in a marked way with temperature.

'thermit, thermite ('θəəmit, 'θəəmait) – mixture of aluminium and iron oxide: when set on fire it gives out very great heat: the oxide supplies oxygen to the burning aluminium, so that the iron is melted. The melted iron can be used to join or repair broken parts, e.g. of a machine.

'thermo'chemistry – study of the heat-changes in chemical reactions.

'thermo'couple (-kʌpl) – two different metals, e.g. copper and iron joined together in two places; when one join is heated more than the other



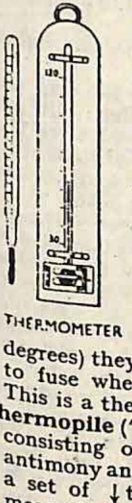
THERMOCOUPLE (diagram)

a current flows; this current (or the voltage) may be used as a measure of the temperature difference.

'thermody'namics (-dai'næmiks) – mathematical study of the relation between heat and work and other forms of energy, e.g. ↓Carnot, ↓entropy. **thermodynamics, laws of** – (1) When heat is changed into work a fixed amount of heat produces a fixed amount of work; so also when work is changed into heat, a fixed amount of work produces a fixed amount of heat. (2) Heat cannot of itself pass from a colder to a warmer Body.

'thermo-elec'tricity – electric current due to difference in temperature, e.g. in a ↓thermocouple: also see thermopile.

ther'mometer (θə'mɔmitə) – instrument for measuring temperature; e.g. the common mercury thermometer as shown.



THERMOMETER

'thermo'nuclear reaction ('θəəmou'njuukliə -) – Nuclei of light elements can be made to fuse (join into one) by firing one against the other under powerful electric forces. This is a nuclear reaction. If the atoms are heated to a very high temperature (millions of degrees) they are moving fast enough to fuse when they hit each other. This is a thermonuclear reaction.

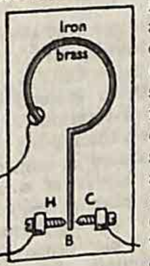
'thermopile ('θəəmopail) – instrument consisting of many small bars of antimony and bismuth joined to form a set of ↓thermocouples, used for measuring radiated heat.

'thermo'plastic substance – substance which becomes soft and easily shaped when heated.

'thermo'setting 'plastics – plastics which become hard when heated and compressed, and cannot afterwards be softened by heat.

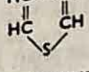
'thermo'siphon (-'saifən) – instrument in which cold water goes down and hot water goes up to some cooling container, e.g. radiator, as in the cooling of a car, but without any pump to push the water round; as also in central heating of houses.

'thermostat – instrument which keeps temperature at the same level, e.g. in an incubator (instrument used instead of a hen to make the young come out of eggs); so also in a refrigerator (used to keep food, etc., cool). The diagram shows a thermostat which controls a cooling and a heating instrument, as for ↓air conditioning. Brass and iron expand unequally when heated. When heated, the curved strip begins to straighten out so that the bar B (between two electric points) touches C, so connecting up a Cooling instrument. When cooled, the strip becomes more curved, so that B touches H, so connecting up a Heating instrument. When the temperature is just right B does not touch either C or H.



THERMOSTAT

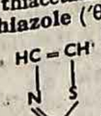
thi-/, thio-/ (θaio-) – sulphur, e.g. **thiophene** – compound similar to benzene; the molecule consists of a ring of four CH groups and one sulphur atom. The prefix often denotes a compound containing a sulphur atom in the place of an oxygen atom, e.g. carbonic acid, H_2CO_3, but **thiocarbonic acid**, H_2CS_3.



THIOPHENE

'thiamides ('θaiəmaidz) – compounds similar to ↓amides but with a sulphur atom in place of an oxygen atom, e.g. acetamide, CH_3CONH_2; thiacetamide, CH_3CSNH_2.

'thiazole ('θaiəzoul) – compound with the ring of atoms as shown. ↓sulphathiazole.



THIAZOLE

'thinner – liquid added to paint to make it more liquid.

thio-/ – see thi-/.

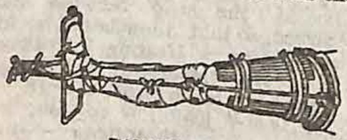
'thio'cyanates (-saioneits) – compounds with the group -CNS, e.g. potassium thiocyanate, KCNS. They are also called sulphocyanides: ↓thi-/. **thiopentone** – ↓pentothal.

'thionyl ('θaiənil) – the group of atoms SO, e.g. **thionyl chloride, $SOCl_2$.**

'thiou'rea ('θaio.ju'riiə) – $CS(NH_2)_2$; substance used with or instead of urea in making urea-formaldehyde plastics; it slows down the solidifying of the plastic and is used in making ↓laminated wood (layers of wood stuck together with plastic; used in medicine to make the ↓thyroid gland less active; it also stops the nitrifying of ammonia by soil bacteria.

'thixo'tropic ('θikso'trɔpik) – having properties (qualities) which are affected by shaking, e.g. a ↓colloid which forms a liquid when shaken and re-forms a jelly when left standing.

Thomas's splint ('tɔməsiz -) – instrument as shown; used to hold the bones of a broken leg in position and prevent movement of the broken ends until the leg can be dealt with in hospital.



THOMAS'S SPLINT

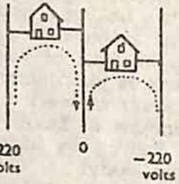
'Thompson effect ('tɔmsən -) – An electric pressure (voltage) is produced by the difference in temperature between two parts of a metal bar; when a current flows from a colder to a hotter part of a metal, heat is taken in or given out.

tho'rac-/ (θɔɔ'ræk-) – of the **'thorax** – the chest; of insects = part of the body between the head and the digestive organs. **'thoraco'plasty** – taking out ribs and *collapsing a lung so that it may have rest (not move) and so get a chance to become well again after a disease, e.g. ↓tuberculosis: *(cause to fall inwards and no longer be filled with air).

'thorium ('θɔɔriəm) – radioactive element; can be changed (in a ↓breeder reactor) into uranium 233 (a source of neutrons); the oxide (ThO_2) is used in making gas mantles (woven tubes heated by gas to give light).

three-day fever – = ↓sandfly fever.

three wire system – way of arranging supply wires of direct electric current in a town as shown, with two outer wires and a return wire. A house uses electricity from one outer wire and the return wire. The houses are equally arranged on each side and so little or no current flows on the return wire; so the return wire can be made thinner than the other two wires.



THREE WIRE SYSTEM

'threonine – an ↓essential amino-acid.

'threshold ('θreʃould) – the step just outside a doorway; the limit just beyond which there is a certain effect, e.g. **threshold of hearing** – frequency and strength of sounds which can only just be heard.

thrips – very small insect with four wings; it attacks field- and garden-plants, e.g. onions; singular and plural thrips.

THRIPS

thromb/-o-/ – ↓thrombus.

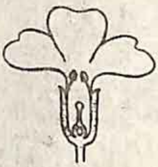
'thrombin ('θrɔmbin) – When you cut (e.g.) your finger a substance set free from the cut cells causes **'prothrombin** (a substance in the blood) to change into thrombin, and this causes fibrinogen (a substance which is about ½% of the blood) to solidify into fine threads which hold the rest of the blood into a solid mass (clot of blood).

'thrombus ('θrɔmbəs) – a clot (solid mass of blood) formed in a blood vessel. **throm'bosis** – the formation of such a clot: if the clot is carried by the blood to the heart it may cause death, or in the brain it may cause paralysis (loss of muscular power, e.g. on one side of the body).

'**throttle** – valve or tap used to control the inlet of steam into a steam-engine, or the petrol-air mixture to a motor-car engine, etc.

'**throwing** – shaping clay on a potter's wheel.

'**thrum-eyed** – word used of a flower, e.g. primrose, which has high stamens (male parts) and a short pistil (female part). ↓ pin-eyed.

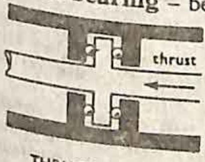


THRUM-EYED

thrush – (1) infection of the mouth with a fungus causing white areas on the tongue and the inside of the mouth; (2) inflammation of the V-shaped underpart (↓ frog) of a horse's foot.

thrust – a pushing force spread over an area, e.g. on the bottom of a container due to the water in it, or on the pillars carrying an arch.

'**thrust bearing** – bearing used where a revolving rod (axle) pushes against a **thrust-block**, e.g. where the axle of a ship's propeller presses against the ship to drive it forward. ↓ Michell.



THRUST BEARING

'**thrust plane** – surface over which rocks are pressed by the contraction of the surface of the Earth.

'**thymus gland** ('θaiməs -) – a gland just inside the breast-bone; it becomes smaller after the age of 2, and begins to disappear at about age 13. It is believed to control the speed of growth (but not the final size). ↓ status lymphaticus.

'**thyratron** ('θairətrɔn) – trade name for a gas-filled ↓ triode (radio valve with 3 electrodes – cathode, grid and anode). In an ordinary vacuum triode the grid controls and varies the strength of the current (flow of electrons) through the valve. In a thyratron the current is very small unless – (1) the ⊖ voltage on the grid falls to a certain value, or – (2) the ⊕ anode voltage rises to a certain value. The gas is then ionized (made into ⊕ and ⊖ particles) and a big current flows. The grid then has no control and the big current flows until the anode voltage falls to a certain value. A thyratron is used (1) as a switch for turning on a big current by a small change in the grid voltage, and (2) for providing an easy path if a voltage rises to a certain value (as in ↓ saw-tooth wave). Also called gas-filled relay.

'**thyro-**/ ('θairo-) – having to do with '**thyroid gland** (gland in the lower front part of the neck): it becomes enlarged in ↓ goitre: it is a storehouse of iodine, and produces a substance, **thy'roxine**, which affects growth and activity. Lack of this substance causes slow development of body and mind: excess causes excitability; '**thyrotoxi'cosis** ↓ Graves' disease.

THYROID

Ti – chemical sign for ↓ titanium.

'**tibia** ('tibiə) – the front (straight) bone of the lower leg.

tic – habit-spasm, repeated sudden contraction of the muscles, e.g. twisting the face, shutting one or both eyes, etc., due to habit (not to any disease).

tic 'douloureux (- 'dulurəə) – nerve pain in the forehead, face and jaw, with (sometimes) contractions of the muscles in that part = facial neuralgia.

TIBIA

tick – blood-sucking creature of the spider family found e.g. on dogs.

TICK

tie, '**tie-rod** ('tai-rɔd) – bar (e.g. as part of a roof or bridge) used to pull and hold two parts together.

tin-plate – thin steel coated with tin by being dipped in melted tin, used for containers e.g. of food.

tinct-/ (tiŋkt-) – dye, solution. **tinc'torial** (tiŋk'tɔɔriəl) – of dyes. **tincture** – solution of a vegetable-drug (or other drug) in alcohol, e.g. tincture of belladonna, of iodine.

'tinea ('tiniə) – = ↓ringworm.

'tinman's 'solder – very easily melted ↓solder.

'tinnitus ('tinitəs) – noise in the ear not due to sound but to disorder of the ear.

tin'tometer – instrument for comparing colours (e.g. of liquids) with standard coloured pieces of glass or standard solutions.

'tissue ('tisiu) – mass of cells forming a part or layer of the body, e.g. muscular tissue, epi'thelial (= surface covering) tissue, connective tissue, nervous tissue.

ti'tanium (tai'teiniəm) – metal element, used for removing oxygen and nitrogen from steel; used with tungsten for making very hard cutting-tools; for strong aluminium alloys; for making smoke e.g. to hide warships; also used in dyeing, paint, and glass making.

ti'tration (ti'treiʃən) – Small measured quantities of one liquid (e.g. acid) of known strength are added to a known quantity of another liquid (e.g. alkali) until a certain chemical change is just completed; in this way the strength of the second solution is measured.

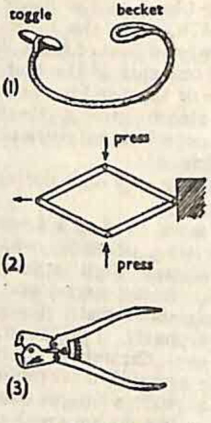
Tl – chemical sign for ↓thallium.

'Tobin 'bronze ('toubin 'brɔnz) – bronze (copper + tin + zinc) containing about 60% copper and little or no tin, used where resistance to the effect of sea-water is needed.

toc-/ (tous-) – having to do with childbirth, e.g. **dys'tocia** (dis'tousiə) – difficulty in giving birth to a child. **/-tocous, /-tokous** (-touk-) – e.g. **'mono'tocous** = producing one young at each birth; so also **'poly-'tocous** (many).

toggle – (1) short wooden piece put through a loop, like a long button; (2) arrangement of bars, as shown, used to produce great pressure. **toggle-jointed cutter** – tool as shown for cutting thick wire.

'tolerance, degree of ('tɔlərəns-) – (in a part made for a machine) amount of difference from the exactly right size which can be allowed. ↓limit gauge.



TOGGLE

'toluene ('tɔljuiin) – = **toluol** = methyl-benzene, $C_6H_5.CH_3$ – a colourless liquid obtained from coal-tar, used in making dyes and explosives, e.g. T.N.T. (TriNitro Toluene).

'tommy bar – bar put through the hole in a box-spanner (↓spanner) to turn it.

/-tomy (-təmi) – cutting, e.g. **li'thotomy** – cutting open the bladder (in which urine collects) to take out a stone (*lith-/*).

ton (tʌn) – **long ton** – 2,240 pounds as for coal. **short ton** (U.S.A., and for metals) – 2,000 pounds. **metric ton** (= **tonne**) – 1,000 kilogrammes, 2204·6 pounds. In measuring ships to calculate money due for use of a canal, harbour, etc., ton = 100 cubic feet space, e.g. **under deck tonnage** = below deck volume so measured; the **gross tonnage** – includes above deck spaces, e.g. deck-houses.

tone (toun) – (1) quality of musical notes or colours; (2) healthy condition, e.g. of a muscle.

tone-deaf – not able to hear the difference between musical notes.

'tonic ('tɔnik) – ("strong, strengthening"): medicine used to increase activity of the body (or of a certain part) so as to lead to better health by exciting the person to make greater use of it.

-tonic – strength, e.g. **'hyper'tonic so'lution** – stronger of two solutions so that if the two solutions are on each side of a membrane through which water can pass, water passes from the weaker to the stronger solution. **isotonic solutions** – two solutions of the same strength. ↓ osmosis.

'tonic con'traction – contraction of a muscle which continues; (clonic contraction = tighten – loosen – tighten and so on).

'toning ('touniŋ) – changing the colour of photographic pictures by means of chemicals.

'tonnage ('tʌnidʒ) – ↓ ton.

tonne (tɔn) – metric ton = 1,000 kilograms = 2204·6 lb. = 0·98 ton.

'tonsils ('tɔnsls) – two small glands at the back of the mouth; they produce ↓ lymph cells, and help to protect the throat from infection.

TONSILS

'tonus ('tounəs) – state of contraction of a muscle.

'topaz ('toupæz) – transparent light blue or light yellow jewel.

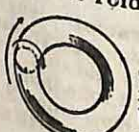
'tophus ('toufəs) – small crystal of sodium urate found in the tissues (e.g. ear) of *gouty people: *(having excess of uric acid in the blood).

topo-/ – place, e.g. **to'pography** (to'pɔgrəfi) – describing (e.g. by a map) the features (e.g. hills, rivers, etc.) of a place or country; the features themselves.

'topping-up – filling up (e.g. a storage battery) with liquid to the correct level.

toric – ↓ **toroid.**

'toroid, to'roidal (-tɔɔ'rɔidl) – shaped like a **torus** (thick solid ring). Any part of the surface is curved in two ways as shown by the two arrows in the drawing. **toric lens** – spectacle lens, concave (curved in towards the centre) on the side nearer the eye, toroidal on the side further from the eye.



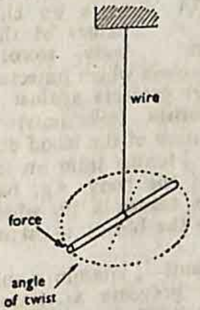
TOROID

torque (tɔɔk) – the twisting force, e.g., on the axle of an air-screw or of a ship's propeller.

'Torri'cellian vacuum ('tɔri'tʃeliən) – space containing mercury vapour (but no air) above the mercury in a barometer. (Italian, 1608–1647.)

'torrid zone – area of the Earth between 23° 30′ N. and 23° 30′ S. in which it is always hot. The equator divides it into two equal parts.

tors/-, tort-/ – twist. **'torsion balance** ('tɔɔʃən) – instrument for measuring very small forces due to magnetism, electricity or gravity. The instrument is designed so that the force acts on the end of a short level bar which hangs on a thin wire. The bar turns until stopped by the twist of the wire. By measuring the angle of turning and knowing the twisting power of the wire, the force can be calculated.



TORSION

'torti'collis ('tɔɔti'kɔlis) – twisting of the head or the neck to one side, caused by contraction of the muscles due (e.g.) to cold.

'torul-/ ('tɔrjul-) – shaped like a necklace of round stones on a string. **'torulae** – fungus-like yeasts which form chains of round cells.

'total ('toutəl) – (1) the result of adding, e.g. 2 + 4 + 5, total = 11; (2) whole, complete, e.g. **total internal reflection** – If a ray of light which is travelling inside a transparent substance (e.g. glass, diamond) hits the surface so that it makes a small angle with it, *all* of the light is reflected back inside the substance. ↓ critical angle.

'tourmaline ('tuəməliin) – transparent jewel, of various colours (including black), composed of boron and aluminium silicates.

'tourniquet ('tuənikei) – instrument, e.g. twisted string, for pressing a hard pad on to an artery so as to stop bleeding.

TOURNIQUET

'toxi-/, /-'toxic ('tɔksi-k) – containing **'toxins** = poisons produced by the action of bacteria on the tissues of the body. **toxoid** – a harmless protein which (injected into the body) protects against a toxin. **to'xaemia** (tɔks'iimiə) – poisoned condition of the blood due to absorbing ↓ toxins from an infected part of the body, e.g. bad teeth. Serious toxaemia (in which bacteria enter the blood) = 'septi'caemia.

'toxamin – an anti- ↓ vitamin, a substance which prevents a vitamin from acting, e.g. raw egg-white combines with vitamins of the B group and prevents them from acting on the body.

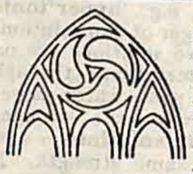
'toxi'cology – the scientific study of poisons.

tra'becula (træ'bekjulə) – ("little beam"): part of the body of an animal or plant which bridges an open space like a beam.

trace elements – elements of which a trace (very small quantity) is necessary for plant- (or animal-) development; without this element the organism fails to grow or is not healthy, e.g. boron (for peas, beans), the reason here is that the root-bacteria need boron. So also manganese for wheat and oats, zinc and manganese for potatoes.

tracer element – a radioactive form of an element, used e.g. to trace the course of the element (e.g. carbon, iron, iodine) through the body: heavy ↓ isotopes are also used.

'tracery ('treisəri) – ornamental arrangement of curved cross-bars in a window.



TRACERY

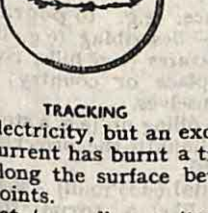
tra'chea (trækiiə) – (1) the windpipe (breath pipe); (2) small breathing tubes in an insect's body; (3) long water-tubes in the wood of a plant stem. **'trache'otomy** ('træki'ɔtəmi) – cutting a hole into the trachea through the front of the neck and putting in a tube so as to give an airway when the throat is blocked, e.g. in ↓ diphtheria.

'tracheid ('treiki.id) – long fibre produced by a plant cell; when large and hollow it forms a tube to carry water in the plant; when thickened and almost solid it is part of the wood forming the skeleton (framework) of the plant. ↓ trachea (3).

trache'otomy – ↓ trachea.

tra'choma (træ'koumə) – serious and very infectious inflammation of the conjunctiva (outer membrane of the eye) causing small grain-like masses on the inside of the eyelid, and loss of transparency of the conjunctiva and of the cornea (horn-like layer just behind the conjunctiva). The disease is common in Egypt.

'tracking (electrical) – See picture: the two points *A* and *B* are screws holding the ends of electric wires in a plate of some substance which is supposed not to conduct electricity, but an excessively strong current has burnt a track (pathway) along the surface between the two points.

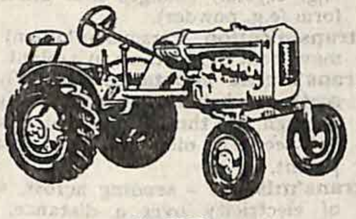


TRACKING

tract-/ – pull, e.g. **'tractor** – engine used for pulling ploughs, carts, etc.

trade winds – winds blowing continuously in the torrid zone (hot area of the Earth): they blow from N.E. in the northern half of the Earth and from S.E. in the southern half.

'trailing edge ('treiliŋ -) – furthest back edge of the wing of an aeroplane.



TRACTOR

train (of wheels) – a series of gear (cog) wheels (watch or clock) – all the wheels carrying the energy of the spring or weight to the hands; an 18,000 train is a set of wheels suitable for a ↓ balance wheel which swings 18,000 times an hour (measuring off time by 1/5th seconds – as in most watches.)

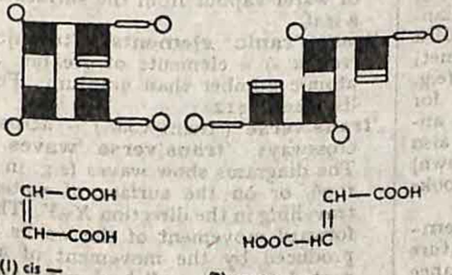
tra'jectory (trə'dʒektəri) – path of a shot from a gun.

tram – (1) electric road-car on rails = **tramcar on a tramway**; (2) small container on wheels on rails used for carrying metal ore, minerals, etc.

'trammels – ↓ beam compasses.

trans-/ – across.

trans-/ (chemistry) – Example: The drawing shows the arrangement of the atoms in a molecule of (1) maleic acid and (2) of fumaric acid. The only difference in the arrangement is that in (1) the COOH groups are on the same side (a cis-compound) and in (2) the COOH groups are on opposite sides. (2) is a trans-compound. So also for other substances which differ in this way in the space-arrangement of atoms.



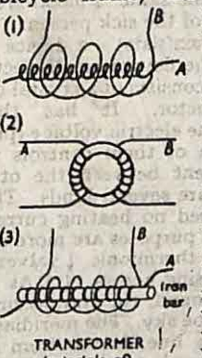
TRANS

trans'ducer (trænz'djuusə) – any instrument which changes one form of energy (e.g. sound) into another (e.g. electricity).

'transference ('trænsfərəns) – In medical treatment of mental disorder (by ↓ psychoanalysis) the emotions felt by the person towards, e.g., his father or mother are sometimes transferred to (changed over towards) the doctor; so that the doctor is emotionally put in place of (e.g.) the father.

transfer machine – a large machine, carrying various tools, in which the thing that is being made is transferred (passed on) from one tool to another by machinery.

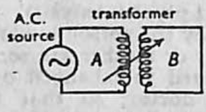
'transfer printing, 'transfer process – printing a picture on to thin paper, then putting the picture on to some surface (e.g. china, pottery, bicycle frame) and taking off the paper, leaving the picture.



TRANSFORMER (principle of)

trans'former (træns'fɔɔmə) – See diagram. Coil *B* is wound round coil *A* but does not touch it. (The coils may be wound on a straight soft bar, or a soft iron ring, but this is not always necessary.) When an alternating current flows through one coil (e.g. *A*), an alternating electric voltage (pressure) is produced in the other coil *B*. The voltage which is produced depends upon the comparative numbers of turns of wire in each coil. In a **step-up transformer** the coil in which the pressure is produced (*B*) has more turns than the coil (*A*) through which the current is passed: a higher voltage but smaller current (amperage) is obtained. A **step-down transformer** gives a lower voltage, but bigger current, by having fewer turns in the second coil (*B*). The coil (*A*) through which the current is passed is called the primary (coil); the coil (*B*) in which the voltage is produced is called the secondary (coil).

transformer coupled circuits – *A* and *B* are two electrical circuits. In circuit *A* there is a source of alternating current. In circuit *B* there is no source. *B* is not joined to *A* by a wire, but when current flows in circuit *A* a flow of electricity is produced in circuit *B* by means of the transformer.



TRANSFORMER COUPLED

trans'fusion (træns'fjuuʒən) – putting blood or plasma (clear liquid of blood without the blood-cells) from a suitable healthy person into a vein of a sick person. The blood used must be of the same ↓ blood-group as the blood of the sick person.

tran'sistor (træn'sistə) – a device for controlling the flow of small electric currents. It consists of a crystal of a ↓ semi-conductor. It has three electrodes; the electric voltage (pressure) on one of them controls the flow of current between the other two. There are several kinds. They are small, need no heating current, and for some purposes are more convenient than thermionic ↓ valves.

'transit – passing across. (1) As the Earth goes round, the stars seem to pass across the sky. The meridian of a place is a line drawn from the North, overhead, to the South pole across the sky (thought of as the inside of a hollow ball). The transit of a star is the crossing of this meridian-line by a star; (2) the passing of a smaller Body (e.g. smaller planet) across the face of a larger Body (e.g. the sun); (3) instrument used for measuring horizontal (sideways) angles, e.g. in map-making; it can also be used for vertical (up-down) angles. For an idea of what it looks like see theodolite.

tran'sition point, transition temperature (træn'ziʃən) – temperature at which one form of a substance (e.g. crystal) changes into another form (e.g. powder).

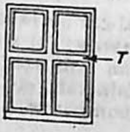
'translo'cation ('trænzlou'keiʃən) – movement of solutions in a plant.

trans'lucent substance (trænz'luusənt) – substance which lets light through, but through which one cannot see, e.g. oiled paper. ↓ transparent.

trans'mission – sending across, e.g. of electricity over a distance, of power from engine to machine. **transmitter** – instrument for sending (e.g.) telegrams or radio waves.

'transmu'tation ('trænzmju'teiʃən) – change of one element into another – (1) naturally (as in ↓ radioactivity), e.g. radium changes into lead; (2) by hitting atoms with heavy high-speed particles (e.g. neutrons, α-particles), e.g. beryllium may be changed into carbon. ↓ cyclotron.

'transoms ('trænsəmz) – (1) cross-bars from one side of a window to the other; (2) cross-bars fixed to the upright post at the back of a ship; these give the stern of the ship its shape; in a boat the transom may be a single piece cut to the curve of the sides of the boat.



TRANSOM

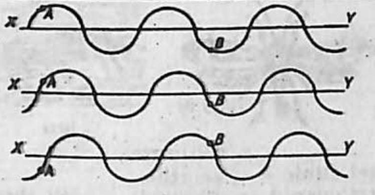
tran'sonic speeds, region – speeds near (a little below or above) the normal speed of sound, e.g. 600–800 m.p.h.

trans'parent substance (træns'peərənt) – substance which lets light through, and through which one can see, e.g. clear glass.

'transpi'ration ('trænspi'reiʃən) – loss of water-vapour from the surface of a leaf.

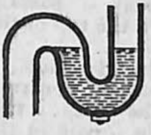
'transu'ranic elements ('trænzju'reinik -) – elements of greater ↓ atomic number than uranium. For list, see p. 412.

'trans'verse ('trænz'vəəs-) – across, crossways. **'trans'verse 'waves** – The diagrams show waves (e.g. in a rope, or on the surface of water) travelling in the direction *X–Y*. The forward movement of the waves is produced by the movement of all particles, e.g. *A*, or *B*, backwards and



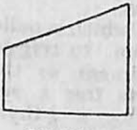
TRANSVERSE WAVES

forwards across the line *XY*. These are transverse waves. Light and radio waves are transverse, but not sound waves. ↓ longitudinal waves.



TRAP

trap – bend in a pipe so that there is water between the lavatory (basin, washing-place, etc.) and the drain, and no smell can come up from the drain.

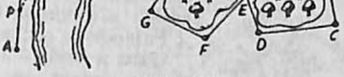


TRAPEZIUM

tra'pezium (trə'piiziəm – four-sided figure of which two sides are parallel.

'trauma ('trɔɔmə) – (1) damage to the body, e.g. a wound; (2) damage to the mind caused by some great emotion.

'traverse ('trævəs) – way of drawing a map, e.g. to draw (1) a map of a river, (2) a map of a wood: – Start at *A*. Measure direction and distance *AB*. So fix *B*. From *B* find the distance and direction of *C*, from *C* . . . etc. (1) is an **open traverse,** (2) a **closed traverse.** ("Ties" like *p, q* are useful to test accuracy.)



TRAVERSE

trawl (trɔɔl) – a large net (fixed to a beam) drawn along the bottom of the sea to catch fish. **trawler – ship used for catching fish with a trawl.**

tread (tred) – **flat surface of a step; part of a wheel that touches the ground.**

Trema'toda ('tremə'toudə) – **class of parasitic flat-worms, e.g. ↓ flukes.**

'tremor ('tremə) – (1) **shaking e.g. of the hand, head, or of a single muscle or small group of muscles, as in nervous disease, and in old age: ↓ intention tremor; (2) shaking of part of the surface of the Earth.**

treenail, trenail (trenl) – **wooden pin to hold together a wood-joint.**

tre'pan, tre'phine (tre'pæn, tre'fain) – (1) to cut a small circular piece of bone out of the skull in order to ease pressure on the brain, or in order to do a surgical operation on the brain; (2) the surgical instrument used for this.

'trepo'nema ('trepɔ'niimə) – ("turn-thread"): spiral thread-like organism. e.g. **Treponema pallidum** – spirochaete – the cause of ↓ syphilis: for picture, see spirochaete.

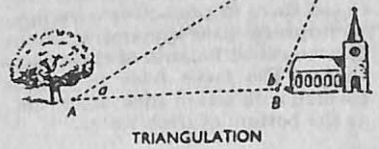
tri-/ (trai) – three, e.g. **'triangle** = figure with three angles; (*chemistry*) containing three atoms (or groups) of named kind, e.g. tri-chloro-benzene = benzene with 3 chlorine atoms in the place of 3 hydrogen atoms in the molecule.

'triad ('traiæd) – a group of three.

trial pit – hole in the ground made to find out what is the nature of the lower substances and the thickness of the layers.

triangle of forces – ↓ forces.

tri'angu'lation – making a map by



TRIANGULATION

dividing up the area into a number of triangles, measuring the bases and angles and so working out the lengths of the sides of the triangles. Start with a known base *AB*. Measure angles *a* and *b* and so fix *C*: hence know *AC* and use it as a base for fixing *D*, etc.

Tri'assic 'period (trai'æsik) – part of the ↓Mesozoic ("middle-life") era in the development of the surface of the Earth and of life; about ? 200–? 175 million years ago, lasting 50 million years. The triassic rocks contain fossils of trees (of the fir and pine family), ferns, large cold-blooded creatures of the lizard kind. Insects began to develop in this period.

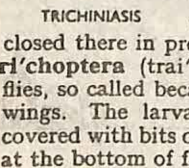
trib-/ (traib-) – rubbing. **tribo-electricity** – electricity caused by friction. **tribo-luminescence** – the giving-out of light caused by rubbing, e.g. by rubbing two pieces of sugar together in the dark. **tribometer** – instrument for measuring friction (rubbing together of surfaces).

'triceps ('traiseps) – muscle behind the arm which straightens out the arm.

trich-/-o (traik-) – ("hair") e.g. **'tricho-cyst** ('traikosist) – a hair-like organ. **tri-choid** – like a hair. **trichome** – a plant-hair.

TRICEPS

'trichi'niasis ('traiki'naiəsis), **trichinosis** – disease caused by hair-like parasitic worms (**Tri'china spi'ralis**) which enter the body in infected pig-meat. The parasites enter the muscles and become enclosed there in protective coverings.



TRICHINIASIS

Tri'choptera (trai'kɔptərə) – caddis flies, so called because of their hairy wings. The larva lives in a tube covered with bits of stick, stone, etc., at the bottom of fresh water.

TRICHOPTERA

tri'clinic = ↓anorthic.

tri'cuspid (trai'kʌspid) – with three points, e.g. the tricuspid valve of the heart between the two right-hand-side parts of the heart from which blood is pumped into the lungs.

tri'forium (trai'fɔɔriəm) – passage round a church above the top of the main windows.

tri'geminal nerve (trai'dʒeminəl) – nerve with three branches; it carries sensations from the face. **tri'geminal neu'ralgia** – pain in the face due to disorder or inflammation of the trigeminal nerve.

'trigger – part of a gun which is pulled in order to fire the gun. **to trigger** – arrange an instrument so that some small force sets free a very much greater force; e.g. a ↓thyratron is a **trigger-valve.**

'triglyph ('traiglif) – block of stone with grooves cut in it in sets of three.

'trigonal ('trigənəl) – = ↓rhombohedral.

'trigo'nometry ('trigə'nɔmitri) – the mathematics of triangles. **'trigono'metrical ratios** – ↓sine, secant, tangent, cosine (etc.).

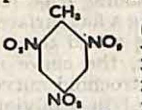
tri'hydrol (trai'haidrɔl) – molecule consisting of three molecules of water, H_6O_3.

'trilobite ('trailəbait) – ancient shell-creature, fossils of which are found in ↓Palaeozoic rocks.

TRILOBITE

trim a boat – arrange weight in a boat (or ship) so that the boat lies level on the water, both endways and side to side. **trim of an aeroplane** – condition in flight, especially not heavier at the front or back.

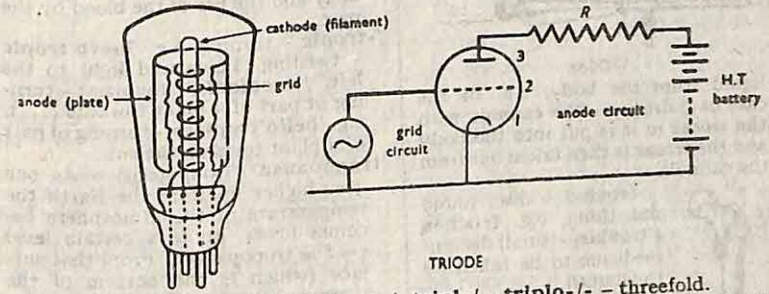
'trimerous ('trimerəs) – with flower parts arranged in threes, e.g. Lily family: petals 3 + 3, stamens 3 + 3, parts of ovary, 3.



TRI-NITRO-TOLUENE

tri-'nitro-'toluene (trai'naitro-'tɔljuiin) – yellow crystalline compound used as an explosive in shells. ↓ toluene.

'triode ('traioud) – radio valve consisting of three parts: (1) cathode which sends out electrons, (2) grid (wire net), (3) anode (positive plate). A small change in the electric voltage of the grid has a big effect on the flow of electrons to the anode and hence on the current in the anode circuit. A small alternating voltage on the grid gives a big alternating voltage in the anode circuit (e.g. across the ends of the resistance *R*) so that the valve amplifies (strengthens) the voltage. A ↓ transistor may also be used as a triode.

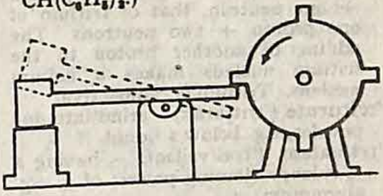


TRIODE

'tripack process of colour photography ('traipæk -) – process of ↓ subtractive colour photography using three films stuck or held together so that one beam of light passes through all three; in a bi-pack system the red and blue films are together; green is separate, and the beam of light is divided into two.

trip-hammer – mechanical hammer giving repeated blows very quickly, used, e.g., for beating out metal.

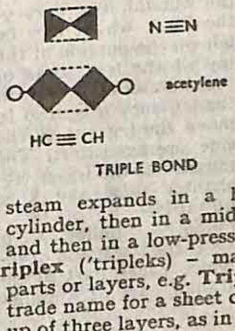
'triphenyl'methane dyes ('traifenil-) – big group of dyes whose molecules contain the triphenylmethane arrangement of atoms. (methane – CH_4; put 3 phenyl groups C_6H_5– in place of three H atoms – $CH(C_6H_5)_3$.)



(principle of) TRIP-HAMMER

tripl-/-, triplo-/- – threefold.

triple bond – three joins between two atoms, e.g. between the carbon atoms of acetylene.



TRIPLE BOND

triple expansion engine – engine in which the steam expands in a high-pressure cylinder, then in a middle cylinder, and then in a low-pressure cylinder.

'triplex ('tripleks) – made of three parts or layers, e.g. **Triplex glass** – trade name for a sheet of glass made up of three layers, as in the windows of motor-cars.

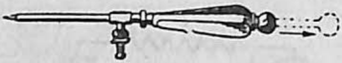
'trismus ('trizməs) – contraction of the muscles of the jaw so that the jaw remains tightly shut as in ↓ tetanus.

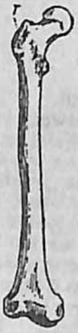
'tritium ('tritiəm) – third ↓ isotope of hydrogen. The nucleus of the normal hydrogen atom consists of one positive particle (= proton), that of deuterium (2nd isotope) of one proton + one neutron, that of tritium of one proton + two neutrons. The adding of another proton to the tritium nucleus makes a helium nucleus. Tritium is radioactive.

'triturate ('tritjureit) – grind into fine powder, e.g. below a liquid.

'tri'valent ('trai'veilənt) – having a ↓ valency (joining power) of 3, e.g. aluminium.

'trocar ('troukaa) – pointed bar in a **'cannula** (tube) used for draining out liquid from the body, e.g. in the case of ↓ dropsy. The cannula with the trocar in it is put into the body and the trocar is then taken out from the cannula.


TROCAR

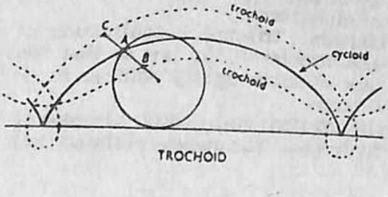


TROCHANTER

troch-/ – disc, round flat thing, e.g. **troches** ('troukiz) – small discs of medicine to be taken by the mouth.

tro'chanter, great trochanter (tro'kæntə) – the outstanding part of the bone which can be felt on the outside of the top of the leg; some of the muscles used to turn the leg outwards, also to move the leg out to the side, are fixed to it. The muscles of the lesser trochanter raise the knee upwards.

'trochlea ('trɔkliə) – "pulley", e.g. curved groove at the lower end of the upper arm-bone; other part of the body shaped like part of a pulley wheel.



TROCHOID

'trochoid curve ('troukɔid -) – curve made by any point on the spoke (*B*) or edge (*A*) or outstanding edge (*C*) of a wheel rolling along a flat surface. If the wheel is rolling round the inside of a fixed circle, the curve is **hypotrochoid.** The trochoid curve is of importance (e.g.) in studying the movement of water in sea-waves.

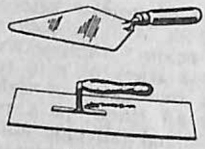
/-troph – food, feed, e.g. **hy'pertrophy** (hai'pəətrəfi) – over-feeding of, over-growth of a part of the body. **'trophic** ('trɔfik) – having to do with the effect of health of the nerves on the supply of blood to a part of the body and the use of the blood by the part.

/-tropic – turning, e.g. **'laevo'tropic** – twisting ↓ polarized light to the left. **/-tropism** (-'troupizm) – turning of part of a plant towards (...), e.g. **'helio'tropism** – turning of part of a plant towards the sun.

'tropopause ('troupopɔɔz) – As one goes higher up from the Earth the temperature of the atmosphere becomes lower, up to a certain level (= the tropopause). From that surface (which is the bottom of the ↓ stratosphere) the temperature ceases to fall as one goes higher above it: at the Poles the tropopause is 6 miles up, at the equator 11½ miles.

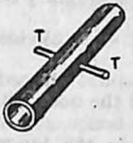
troposphere ('trouposfiə) – the layer of atmosphere nearest the Earth in which there are weather-changes, and in which temperature decreases with height above the ground.

'trowel ('trauəl) – tool as shown for putting mortar (or cement) on bricks in building. **plasterer's trowel** – a flat piece of metal with a handle on the back for putting plaster on walls or ceilings. **gardener's trowel** – a curved blade used for digging small holes, e.g. to put a root in.


TROWEL

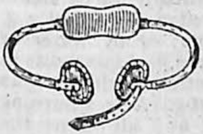
trun'cated (trʌŋ'keitid) – as if the point had been cut off, e.g. a **truncated cone.**

'trunnel – = ↓ trenail.



TRUNNIONS

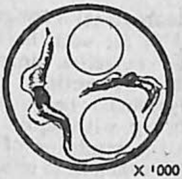
'trunnions ('trʌnjənz) – small bars standing out from the sides of (e.g.) a gun or a big telescope so that it can be made to slope up or down on them as on an axle.



TRUSS

truss – framework, e.g. triangular frame carrying a roof or bridge; ↓ Fink, Howe, K. **truss** (medical) – instrument used to support the front muscular wall of the body in cases where, owing to weakness, the bowel tends to come through. ↓ hernia.

'trypano'somes ('tripæno'soumz) – disease-causing parasites consisting of a long body with a membrane along the whole length with which they swim; cause of ↓ sleeping sickness, also of Chagas disease, carried by a bed-bug. (The round things in the picture are blood cells.)



TRYPANOSOMES

try'parsamide (tri'paasəmaid) – medicine containing arsenic; more powerful as a cure of **'trypanoso'miasis** ('tripənəso'maiəsis) (↓ sleeping sickness) and less harmful to the sick person than any other cure: (trade name).

try-plane – plane (tool) about 22 inches long for smoothing wood.

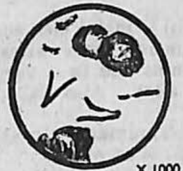
'trypsin ('tripsin) – a substance (↓ enzyme) produced by the ↓ pancreas which helps to break down proteins in the bowel. (The pancreas is stimulated by ↓ secretin from the bowel to produce **tryp'sinogen** from which trypsin is formed.)

'trypto'phan – an ↓ essential amino-acid.

'tsetse fly ('tetsi) – fly which carries the organism of ↓ sleeping sickness.

tube (*radio*) = valve, e.g. ↓ triode.

'tuber ('tjuubə) – (1) enlarged underground stem, e.g. potato; (2) a **tube'rosity** – an outstanding mass of bone, e.g. **tuber ischii** – the point of the ↓ ischium (one of the two bony points on which you sit).



TUBERCLE BACILLUS

'tubercle ('tjuubəkl) – (1) small round swelling on a plant, or on the body; (2) small mass in the tissues caused by the tubercle bacillus (cause of tuberculosis). **tu'bercu'losis** (tju'bəəkju'lousis) – disease, e.g. of the lungs, caused by the **'tubercle ba'cillus**; it may affect other parts of the body, e.g. joints; (The rods in the picture are bacilli; the masses are blood cells or lymph cells: magnified 1,000 times.) **tu'berculin** – substance prepared from the tubercle bacillus for use in discovering whether a person has (or has had) tuberculosis.

tube'rosity – ↓ tuber.

'tufa ('tjuufə) – sponge-like stone (calcium carbonate) made e.g. by hot mineral water coming up out of the earth.

'tula'raemia ('tuulə'riimiə) – disease similar to ↓ bubonic plague carried to Man by insects from rats or rabbits or directly by touching. (Tulare = part of California.)

tum-/ (tjuum-) – swell. **'tume'faction** – swelling. **'tumid** – swollen.

'tumbler switch ('tʌmblə -) – switch as ordinarily seen in a house for turning electric light on/off.

'tumour, 'tumor ('tjuumə) – diseased swelling composed of cells; if the cells are growing in among cells of the body and causing them to break down, it is a malignant (dangerous) tumour: ↓ cancer. A benignant tumour is enclosed and, if it grows, pushes back the surrounding tissues: e.g. adenoma, fibroma, wart.

'tundras ('tʌndrəz) – flat lands in the north where the under-soil is always frozen.

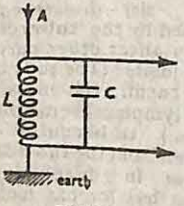
tuned circuit – a circuit consisting of a coil and a condenser arranged either to be in easy circuit for certain frequencies (see diagram for tuning, below), or to have a high resistance for certain frequencies (see diagram for ↓rejector).

tung oil (tʌŋ) – yellow quick-drying vegetable oil used in varnishes and paints.

'tungsten ('tʌŋstən) – metal element used in the filaments (thin wires) inside electric lamps and in a very important steel alloy. Also called wolfram.

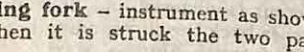
'tunic, 'tunica (- 'tjuunikə) – coat, outer covering e.g. of an organ.

'tuning (radio) – First see natural frequency. The diagram shows a simple arrangement of the first part of a radio receiver. *A* is the aerial, *C* a condenser, *L* a coil. Radio waves which strike *A* produce an alternating current in the *LC* (coi*L* *C*ondenser) circuit. From there the effect is passed to the rest of the set for taking out the music, words, etc. and for strengthening. The current is small and useless unless the natural frequency of the *LC* circuit is the same as the frequency of the incoming waves. So by changing the natural frequency of the circuit the set can be made to answer to waves of whatever frequency one chooses. The process of changing the natural frequency for this purpose is **tuning-in**, and the *LC* circuit is the **tuning circuit.** As the natural frequency depends upon the sizes of *L* and *C*, the frequency can be changed by changing the size of the coil (*L*) or, more usually, of the condenser (*C*). ↓variable condenser.



TUNING

'tuning fork – instrument as shown. When it is struck the two parts vibrate and give out a single pure note.



TUNING FORK

tunnel-worm ('tʌnəl -) – ↓ankylostoma duodenale.

'turbinal ('təəbinəl) – spiral shaped, e.g. **turbinal bones** of the nose; the air passes over these bones and is warmed as it goes into the lungs. **'turbinate** – like a spinning top.

'turbine ('təəbain) – engine producing power by water hitting (or by steam blowing) on the edge of a wheel, e.g. ↓impulse turbine; or by water or steam driven through sloping slits in a wheel: ↓reaction turbine. **gas turbine** – the hot gas from a burning mixture of fuel and air turns the blades of a turbine. If the turbine is directly joined to the airscrew of an aeroplane, a **turbo-prop** engine is formed. (In a **turbo-jet** engine the turbine drives a compressor.) **turbo-generator** – electric generator driven by a turbine.

'turbulent flow ('təəbjulənt) – irregular flow of liquid or air with backward and circular currents, not a smooth flow all in one direction.

tur'gescent (təə'dʒesənt) – becoming **'turgid** – swollen, e.g. with liquid.

'turgor ('təəgɔɔ) – the condition of a plant cell which has taken in so much water that its walls are fully stretched; so also such fullness in a part of the body.

'turnbuckle – = ↓bottle screw.

turned sorts – printers' type used face downwards to show where some missing sign or letter is to be put, e.g. see page ■■ (the page number not yet being known).

'turpentine ('təəpəntain) – $C_{10}H_{16}$; oil as commonly used in paint and to clean paint-brushes.

'turquoise ('təəkwɔiz) – light green-blue precious stone; (a form of aluminium and copper phosphates).

'turret ('tʌrit) – small tower. **turret lathe** – lathe on which there is a drum (turret) into which several cutting tools can be fitted for use one after another on the same piece of metal.

'tussore (tussah, tussur) silk ('tʌsɔɔ -) – woven silk made from the silk of the wild silk-worm: the larva bites its way out of the cocoon (ball of silk made by the larva) so the fibres are shorter than other silk; the cloth is light brown and has a rough surface.

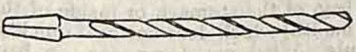
'tuyère ('tuiieə) – copper pipe through which hot air is blown into a furnace for making iron from iron ore.

twelfth – measure of the thickness of the movement (works) of a watch = 0·188 millimetres = $\frac{1}{12}$ ligne. ↓ ligne.

twilight sleep – state of half-consciousness used in childbirth, produced e.g. by ↓ sco'polamine. (Complete loss of consciousness as for surgery would cause loss of the necessary action of the muscles.)

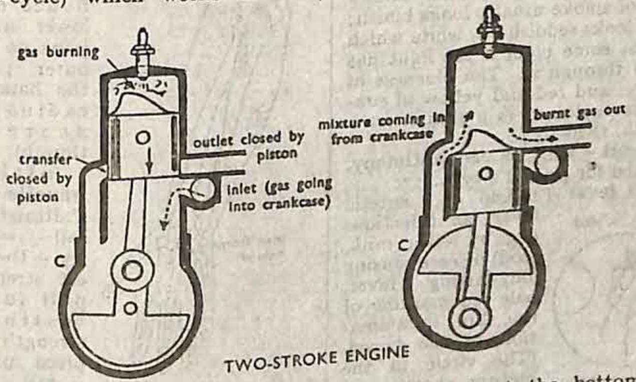
twill – cloth woven with diagonal lines across it.

twist drill – tool as shown, used for making holes.



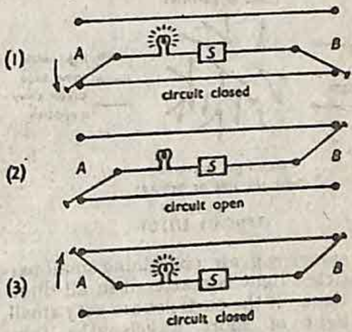
TWIST DRILL

two-stroke engine, two-cycle engine – a petrol engine (e.g. on a motor-cycle) which works in the following way:– (1) Down-stroke: the vapour is exploding above the piston: fresh petrol vapour is going through the inlet into the crank-case (round part in which the axle is). The outlet is closed. The transfer is a pipe leading vapour from the crank-case into the cylinder; it is now closed. (1b) Bottom of down stroke: the burnt gases are going out through the outlet; the transfer is open and fresh vapour is going into the cylinder; the vapour is guided upwards (above the burnt vapour) by the shape of the top of the piston. (2) Up-stroke: the piston goes up, and the vapour is exploded just as the piston begins to come down again.


gas burning
outlet closed by piston
transfer closed by piston
inlet (gas going into crankcase)
C
mixture coming in from crankcase
burnt gas out
C

TWO-STROKE ENGINE

two-way switch – A two-way switch is put (e.g.) at the bottom of a staircase and another is put at the top. In diagram 1 the lamp has been turned on at the bottom by moving switch *A* down. In diagram 2 the person has reached the top of the stairs and has turned off the same lamp by moving switch *B* up. The lamp can now be turned on again by



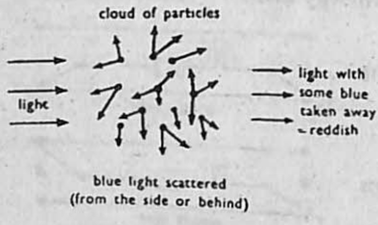
TWO-WAY SWITCH

moving switch *B* down or by moving switch *A* up.

'twyere ('twiiə) = ↓tuyère.

'tympanum ('timpənəm) – the ear-drum (membrane of tne ear moved by sound waves).

Tyndall effect ('tindəl -) – When a beam of light passes through a substance, e.g. air, containing small particles, light is scattered in all directions. If the particles are very small, light of short wavelengths (blue light) is scattered most, and light of long wavelengths (red) least. Thus a cloud of smoke usually looks bluish; but it looks reddish (= white which has lost some blue) if the light has passed through it. The blueness of the sky, and red and yellow of sunset, are explained in a similar way. (British, 1820–93.)


cloud of particles
light
light with some blue taken away – reddish
blue light scattered (from the side or behind)

TYNDALL EFFECT

type metal – alloy of lead, antimony, tin, used for printer's type.

'typhoid fever ('taifɔid -) – enteric fever, an infectious (e.g. by water, milk, food) disease causing long-lasting fever, pale red marking of the skin, inflammation of the bowel. (The circle in the picture shows part of a red blood-cell: magnified 1,000 times.)

TYPHOID FEVER

typhoid state – state of great weakness. The sick person is dreamy and often talking in a low voice, as in the last stage of typhoid fever.

'typhus ('taifəs) – disease carried by lice (↓louse); it causes high temperature, dark red spots, loss of consciousness, delirium (excited dreaming). ↓Rickettsia.

'tyrosine ('tairəsiin) – an ↓amino/-/ acid found in cheese and grain: used by the body in making the dark colouring matter of the skin and hair: also in the ↓thyroid and adrenal glands.

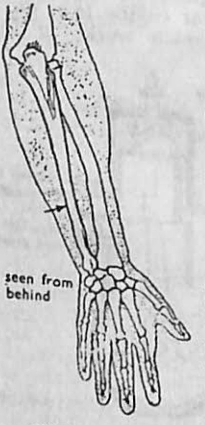
U

U – chemical sign for ↓uranium.

ul-/ (jul-) – of the membrane covering the jaws inside the mouth, the gums, e.g. **u'litis** – inflammation of the gums.

'ulcer ('ʌlsə) – an open area in the surface of the skin or of a membrane (e.g. of the stomach or inside of the mouth) which does not heal quickly.

/-ule (-jul) – small, e.g. sac – a bag, **'saccule** – a small bag.



ULNA

'ulna ('ʌlnə) – one of the two bones of the lower arm: it joins on to the outer part of the hand: (the radius joins nearer the thumb).

'ultimate 'tensile stress ('ʌltimət 'tensail -) = tenacity – the greatest strength of pull (used in testing the strength of a piece of, e.g., metal) divided by the original area of the cross-section of the test piece.

'ultra-/ ('ʌltrə-) – (1) beyond; e.g. ↓ultra-violet rays; (2) very, e.g. **ultra-high frequencies** – radio frequencies of more than 300 megacycles (millions of cycles) per sec.

'ultrama'rine ('ʌltrəmə'riin) – blue colouring matter; in its natural state

= ↓ lapis lazuli; it is manufactured from china clay, sulphur and sodium carbonate; used for paint and blueing (overcoming the yellow colour of washed white clothes, also of sugar).

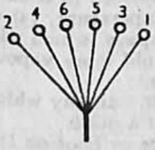
'ultra-'microscope – microscope used for seeing small particles in liquid by means of a strong light coming in from the side and causing the particles to be seen as bright points.

'ultra'sonics ('ʌltrə'sɔniks) – the study of vibrations which have frequencies higher than those corresponding to sound.

ultra-violet light – rays beyond the violet end of the spectrum (i.e. of higher frequency, shorter wavelength than violet); they cannot be seen, but they have an effect on photographic plates and also on the body, e.g. in browning the skin, increasing resistance to disease, and curing certain skin diseases. They cause certain substances to become ↓ fluorescent.

'umbel ('ʌmbəl) – flower-group, with the flower stems all starting from the same place, opening in the order shown by the numbers.

'Umbe'lliferae ('ʌmbe'liferii) – family of flowering plants having flowers in umbels; it includes parsnip, carrot, celery, hemlock.

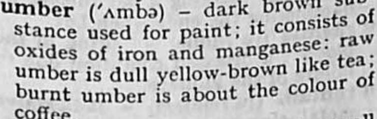


UMBEL

'umber ('ʌmbə) – dark brown substance used for paint; it consists of oxides of iron and manganese: raw umber is dull yellow-brown like tea; burnt umber is about the colour of coffee.

'umbi'licus ('ʌmbi'laikəs) – the small hollow place in the front of the body where the baby was joined to the mother before birth; the navel.

'umbra ('ʌmbrə) – shadow: e.g. the shadow of the Earth on the moon; **umbra** = area of complete shadow (no light); **penumbra** = outer area of partly dark shadow (some light).

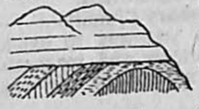


UMBRA

unc-/ – hook, e.g. **'uncus** ('ʌnkəs) – a hook. **'uncate, 'uncinate,** adjs.

uncertainty principle – ↓ quantum mechanics.

'uncon'formity – the resting of a set of rocks of one age on a set of rocks of very different age.



UNCONFORMITY

/**-unct-**/ – rubbing oil (etc.) into the skin, e.g. "medicine for **inunction**" = for rubbing into the skin. ↓ unguentum.

und-/ – wave. **'undulating** ('ʌndjuleitiŋ) – moving up and down like a wave, having a wavy surface; e.g. undulating country.

'under-carriage – the wheels, etc., on which an aeroplane rests when on the ground.

'underclay – layer of clay below a layer of coal. (The roots of the trees from which the coal was formed were in the clay.)

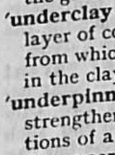
'underpinning – rebuilding or strengthening the base or foundations of a building without touching the upper part.

'undershot wheel – water-wheel worked by the stream flowing below it (not over the top). ↓ overshot.

under way (ship) – moving; having forward momentum (force of movement).

under weigh (ship) – just lifting or having lifted the anchor off the ground (but not, perhaps, moving).

'undine ('ʌndiin) – small bottle used for dropping medicine e.g. into the eye.



UNDINE

'undulant fever ('ʌndjulənt -) – fever which increases and decreases in a regular way; due to the organism *Brucella abortus*, which also causes ↓ contagious abortion in cows.

'ungual ('ʌŋguəl) – of the finger-nails.

'un'guentum ('ʌŋ'gjuentəm) – a

medicine prepared for rubbing into the skin; an ointment.

'Ungu'lata ('ʌŋgju'leitə) – animals (e.g. horses, cows, deer) with hoofs.

uni-/- ('juuni-) – one, e.g. **'uni'cellular** – composed of only one cell. **'uni'directional current** – electric current flowing always in one direction; often called direct current.

'unified field theory ('juunifaid -) – a theory which attempts to explain gravity, electricity and magnetism as different aspects of the same thing.

'uniflow engine – steam-engine in which the steam comes in at either end of the cylinder and goes out from a valve in the middle and so does not change its direction.

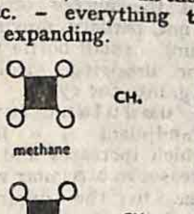
'uni'lateral – only on one side, only in one direction, e.g. a unilateral conductor allows electricity to pass only in one direction, e.g. ↓diode.

'unit mag'netic pole – a magnetic pole (end of a magnet) of such strength that, when it is placed 1 centimetre from an equal pole in a vacuum, the force between them is one ↓dyne.

UNIVERSAL JOINT

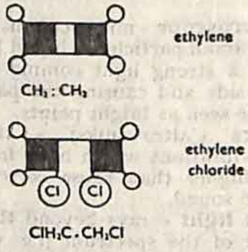
'uni'versal joint – joint between two bars end to end, such that one bar can move almost in any direction; e.g. between the bar driven by a motor-car engine and the bar which turns the back axle.

'Universe, The – all the stars, planets, etc. – everything that there is. ↓expanding.



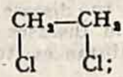
UNSATISFIED VALENCY

unsatisfied bond, unsatisfied valency – a joining power of an atom with nothing joined to it, e.g. the chemical formula of methane is CH_4; all the joining powers (valencies) are here satisfied, but in the methyl group CH_3–, there is one unsatisfied valency.



UNSATURATED

un'saturated (ʌn'sætjureitid) – (1) (chemistry) – having a double (or triple, join between atoms (especially C atoms) so that other atoms, or groups of atoms, can be added, e.g. ethylene $CH_2:CH_2$ is unsaturated; it can join with chlorine to form ethylene chloride –



$$\begin{array}{ll} CH_2\text{—}CH_2 \\ | \quad\;\; | \\ Cl \quad\; Cl; \end{array}$$

(2) of a solution – not having as much substance dissolved in it as is possible at that temperature; (3) of a vapour – The space which the vapour fills could hold more vapour at that temperature.

'upcast, upcast shaft – airway which leads used air out of a mine.

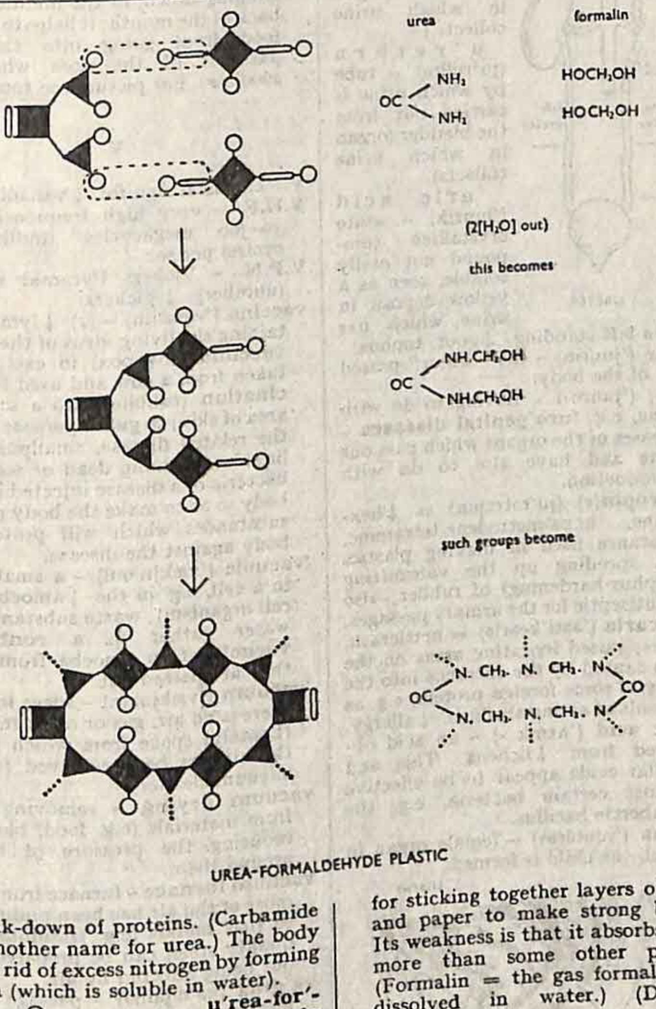
upper – part of a shoe or boot on the upper part of the foot, not the sole (on which you walk) nor the welt (part joining the sole to the upper).

up'setting – making a bar thicker by hammering the ends when hot.

u'raemia (ju'riimiə) – "urine in the blood", a diseased condition due to failure of the kidneys.

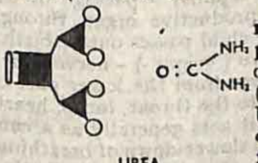
u'ranium (ju'reiniəm) – radioactive metal element; its atomic weight, 238, is the highest found in nature. It has ↓isotopes (other forms) of atomic weights 234, 235; uranium 235 (also plutonium, an element formed from uranium) were used in making the atomic bombs. Uranium is used to colour glass and pottery yellow. ↓transuranic, reactor.

u'rea (ju'riiə) – the chief nitrogen-containing substance of urine, made by the body as the last stage in the



UREA-FORMALDEHYDE PLASTIC

break-down of proteins. (Carbamide is another name for urea.) The body gets rid of excess nitrogen by forming urea (which is soluble in water).

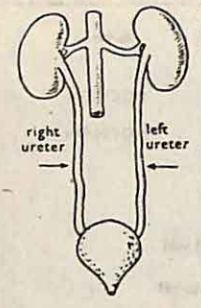


UREA

u'rea-for'maldehyde plastic – colourless plastic (which may be brightly dyed) used for various moulded articles, also for paint, and for sticking together layers of wood and paper to make strong boards. Its weakness is that it absorbs water more than some other plastics. (Formalin = the gas formaldehyde dissolved in water.) (Diagram above.)

'ured-/, 'uredin-/ ('juuredin) – having to do with the 'Uredi'nales, a group of fungus-parasites which cause rust-disease of wheat.

'ureter ('juuritə) – the tube by which urine is carried from the kidney to



URETER

the bladder (organ in which urine collects.)

u'rethra (ju'riiθrə) – tube by which urine is carried out from the bladder (organ in which urine collects).

'uric 'acid ('juurik) – white crystalline compound not easily soluble, seen as a yellow deposit in urine which has been left standing. ↓ gout, tophus.

'urine ('juurin) – the "water" passed out of the body.

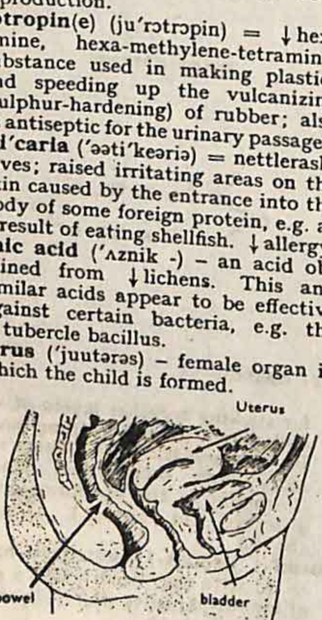
'uro-/ ('juuro-) – having to do with urine, e.g. **'uro'genital diseases** – diseases of the organs which pass out urine and have also to do with reproduction.

u'rotropin(e) (ju'rɔtrɔpin) = ↓ hexamine, hexa-methylene-tetramine, substance used in making plastics and speeding up the vulcanizing (sulphur-hardening) of rubber; also as antiseptic for the urinary passages.

'urti'caria ('əəti'keəriə) = nettlerash, hives; raised irritating areas on the skin caused by the entrance into the body of some foreign protein, e.g. as a result of eating shellfish. ↓ allergy.

'usnic acid ('ʌznik -) – an acid obtained from ↓ lichens. This and similar acids appear to be effective against certain bacteria, e.g. the ↓ tubercle bacillus.

'uterus ('juutərəs) – female organ in which the child is formed.



UTERUS

'uvula ('juuvjulə) – small mass seen hanging down, in the middle, at the back of the mouth: it helps to prevent food from going into the back passages of the nose when you swallow. For picture see tonsil.

V

V – chemical sign for ↓ vanadium.

V.H.F. – very high frequencies, e.g. 30–300 megacycles (millions of cycles) per sec.

V.P.N. – Vickers Pyramid numeral (number): ↓ Vickers.

vaccine ('væksiin) – (1) ↓ lymph containing the living virus of the disease **vaccinia** (cow-pox) in cattle; it is taken from a cow and used for **vaccination** (rubbing into a scratched area of skin) to guard persons against the related disease, smallpox; (2) a liquid containing dead or weakened bacteria of a disease injected into the body so as to make the body produce substances which will protect the body against the disease.

'vacuole ('vækju.oul) – a small space in a cell, e.g. in the ↓ amoeba (one-cell organism); waste substances and water gather in a **contractile vacuole** of an amoeba from which they are passed out.

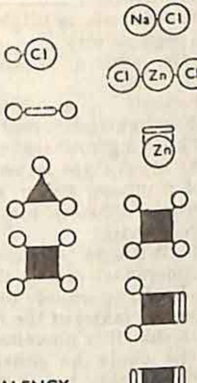
'vacuum ('vækjuəm) – space in which there is no air, gas or other material. (Loosely) space from which part of the air has been removed (as in a vacuum cleaner).

vacuum drying – removing water from materials (e.g. food, blood) by reducing the pressure of the air around them.

vacuum furnace – furnace from which most of the air has been pumped out so that metals (e.g. titanium, high-quality steel) can be prepared without being affected by air.

va'gina (və'dʒainə) – passage of the female reproductive organ through which the child passes out at birth.

'vagus nerve ('veigəs -) – nerve which passes down from the lower part of the brain to the throat, lungs, heart, stomach; it acts generally as a controller and slower-down of breathing, heart-beat, etc. ↓ parasympathetic.



VALENCY

'valency ('veilənsi), **'valence** – the power of an atom to join with other atoms. An element has a valency of 1 if it joins with 1 atom of hydrogen, or with 1 atom of fluorine, or takes the place of 1 atom of hydrogen. Thus 1 atom of chlorine joins with 1 atom of hydrogen (HCl); the valency of chlorine is 1. So also the valency of oxygen is 2 – (H_2O), of nitrogen is 3 – (NH_3), of carbon is 4 – (CH_4).

The valency of sodium (Na) is 1; it can join with 1 fluorine atom (NaF), with 1 chlorine atom ($NaCl$), take the place of 1 hydrogen atom in nitric acid (HNO_3) giving sodium nitrate ($NaNO_3$). The valency of zinc (Zn) is 2; it can join with 2 chlorine atoms ($ZnCl_2$), or with one oxygen atom (ZnO) because the valency of oxygen is 2. The valency of carbon is 4 (e.g. CH_4); 2 of the hydrogen atoms of CH_4 can be replaced by one oxygen atom (H_2CO, formaldehyde); 4 of the hydrogen atoms can be replaced by 2 oxygen atoms (CO_2, carbon dioxide). ↓ bond, co-ordinate link; co-valency; electro-valency; unsatisfied valency.

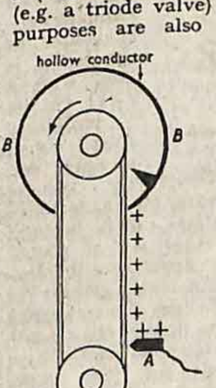
Valencies of the more common elements:

Element	*Symbol*	*Valency*
Aluminium	Al	3
Calcium	Ca	2
Carbon	C	4
Chlorine	Cl	1
Copper	Cu	1 or 2
Fluorine	F	1
Hydrogen	H	1
Iodine	I	1
Iron	Fe	2 or 3
Lead	Pb	2
Magnesium	Mg	2
Mercury	Hg	1 or 2
Nitrogen	N	3 or 5
Oxygen	O	2
Phosphorus	P	3 or 5
Potassium	K	1
Silicon	Si	4
Silver	Ag	1
Sodium	Na	1
Sulphur	S	2
Tin	Sn	2 or 4
Zinc	Zn	2

NOTE – The joins between atoms in a molecule may be made in several ways (↓ co-ordinate link, co-valancy, electro-valency). In some molecules an atom appears to have a valency different from that shown above, e.g. the sulphur atom (S) in sulphuric acid (H_2SO_4).

'valine – an ↓ essential amino-acid.

valve (vælv) – (1) instrument which lets gases or liquids pass in one direction only (in *or* out), e.g. the inlet and outlet valves of a motor-car engine, steam-engine, or pump; (2) **radio valve, thermionic valve** – instrument (depending on the ↓ thermionic effect) which lets electricity flow in one direction only, e.g. a ↓ diode valve. Similar instruments (e.g. a triode valve) used for other purposes are also usually called valves, but, in the U.S.A. "tubes".



Principle of Van der Graaff generator

VAN DER GRAAFF

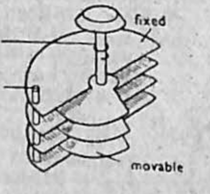
va'nadium (væ'neidiəm) – the hardest metal element; used to remove non-metal impurities in steel-making; used to make a strong steel alloy which is easily shaped; the oxide is used as a ↓ catalyst in making sulphuric acid.

'Van der 'Graaff gen-

erator ('vændə'graaf-) – instrument for generating very high voltages (e.g. 5 million volts). A continuous band of insulating material passes round pulleys. Near the bottom the band passes point *A* : point *A* is kept at a high pressure (several thousand volts) by an electric machine. The charge escapes from point *A* to the band. It is discharged from the band at the top to a hollow conductor *B.B.* This hollow conductor gradually gathers a very high charge and voltage. Discharge through air is lessened by enclosing the whole instrument in tank of air at high pressure (50 lb. per square inch).

'Van der 'Waals forces ('væn də 'vaalz) – weak forces acting between molecules and holding them together.

'vapour ('veipə) – If a gas is above a certain temperature (the critical temperature) it cannot be liquefied (changed into a liquid) by pressure only. Below this temperature it can be liquefied by pressure only. A vapour is a gas which can be liquefied by pressure, e.g. petrol vapour, water-vapour.



VARIABLE CONDENSER

'variable ('veəriəbl) – which may be changed, e.g. **variable condenser** – condenser as shown; it is used with a coil in an ↓ oscillatory circuit, e.g. of a radio set. By turning the handle a greater (or smaller) area of one set of plates can be brought opposite the other set of plates. This makes the capacitance (holding power) of the condenser greater (or less),. and so changes the frequency of the to-and-fro flow of the electric charge: a variable condenser is used in tuning a radio set. (See tuning for a more detailed explanation.)

'variables (mathematics) – quantities which change, e.g. the speed of a falling Body, the volume of a gas which is being compressed; but not the mass of a certain stone.

'variable star – star whose brightness changes in a regular way.

'variance – the square of the ↓ standard deviation.

'variant ('veəriənt) – a plant or animal which is slightly different from the ordinary kind, e.g. four-leaf clover instead of the usual three leaves.

'vari'ation (of compass) ('veəri'eiʃən) – the difference between magnetic north and true north.

vari'ation of 'latitude – Lines of latitude are imaginary circles drawn round the Earth parallel to the equator. The axis (axle) of the Earth moves as it spins: this movement is very slight (it could be contained within a football field), but it means that the equator moves and so causes enough variation of latitude to be important, e.g. in fixing boundary-lines of countries.

'vari'cella ('væri'selə) = ↓chicken-pox.

'varico'cele ('værikou'siil) – enlargement of a vein in the testicles (two parts of male reproductive organ).

'varicose 'veins ('værikous -) – veins (e.g. in the leg) of which a part has become stretched so that the vein is wider than is necessary for the blood which it has to carry.

'variegated ('veərigeitid) – showing a number of colours, e.g. leaves which have red and green and yellow markings.

va'riety (və'raiəti) – a particular kind of certain plant or animal, e.g. there are several varieties of wheat, of men, etc. The qualities of a variety are passed on to the offspring. (The word is not a very exact one.)

vari'ola ('væri'oulə) = ↓ smallpox.

'varnish ('vaaniʃ) – resin dissolved in a liquid to make a transparent paint – sometimes quick-drying.

'Varve a'nalysis (vaav -) – study of the layers of sand and clay deposited year by year by the melted ice in lakes in Scandinavia; by this means dates of changes of weather, etc., can be fixed as far back as 8000 B.C.

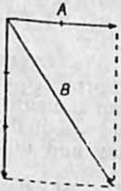
vas (væs) – a small tube of the body.

vascular ('væskjulə) – having to do with the blood-vessels, and other vessels which carry liquids round the body. **vascular bundle, vascular tissue** (plant) – the special tissue (e.g. in the middle of a root) along which liquids pass from one part of a plant to another.

vaso-/ (veizo-) – having to do with blood-vessels, e.g. **'vasocon'strictor** – nerve or substance which causes contraction of an artery. **'vaso-'motor nerve** – nerve which causes contraction or expansion of arteries. **'vaso'pressor** – substance which causes increase of blood-pressure.

'vat dyes – The dye (e.g. indigo) is de-oxidized to a colourless form which is soluble. The cloth is soaked in the solution; the colour develops when it oxidizes, e.g. in the air.

'vector ('vektə) – a quantity (e.g. force) which has (1) direction and (2) size, and so can be represented by a straight line. Example – see the diagram: the lines *A* and *C* show forces acting in certain directions. (The arrow shows the direction; the length of the line shows the strength (size) of force.) Vectors cannot be added in the ordinary way, e.g. if $A = 2$, $C = 3$, these do not add together to make 5, unless they are acting in exactly the same direction; they may be combined as shown in the diagram: *B* is the vector which results from the combined action of *A* and *C*. ↓ forces, parallelogram of.



VECTORS

'vector – carrier of disease from one animal or plant to another. The vector is usually an insect, e.g. fleas carry plague from rats to man.

'veering – e.g. "The wind is veering to the east" – changing direction in the order North – East – South – West: (the other way round, North – West – South – East is called backing).

'vege'tation ('vedʒi'teiʃən) – all the plants in a certain area.

veins (veinz) – (1) blood-vessels carrying blood from the body or lungs to the heart. But the **portal vein** is a blood-vessel which carries blood from the bowel to the liver; it is joined by veins from other digestive organs and carries the results of digestion to the liver; the **pulmonary vein** carries oxygenated blood from the lungs to the heart; (2) tubes in plant leaves which carry liquids.

ve'locity (vi'lɔsiti) – speed in a certain direction, e.g. 30 m.p.h. northwards. **group velocity** – Any signal (by radio, etc.) contains waves of more than one wavelength. Waves of different wavelengths travel through substances at slightly different speeds. The result is that the velocity of the group of waves representing the signal travels at a different (slower) speed from that of the waves.

velocity of escape – least speed which a Body must have if it is to escape (get free) from a planet, etc., and not fall back; e.g. the velocity of escape from the Earth is about 7 miles per second; a shot fired upwards at this speed would not fall back.

velocity of light – nearly 30,000,000,000 centimetres per second (in a vacuum) = about 186,000 miles per second. **velocity of sound** – in air, 1,120 feet per second; in water, 4,800 feet per second.

velocity ratio – of a pulley, lever, etc.: speed of movement of pulling the string (pressing the lever, etc.) ÷ speed of movement of the load lifted by the pulley (lever, etc.).

ve'lour (ve'luə) – cloth with its surface covered with short hairs produced by combing the cloth with wire brushes.

'velvet ('velvit) – silk cloth with upstanding threads all over its surface made (e.g.) by weaving over a wire and then cutting the loops so made. **'velve'teen** – velvet-like cloth made of cotton.

'vena 'cava ('viinə-'kævə) – either of the two veins (inferior vena cava = lower, and superior vena cava = upper) which lead blood from the body into the right side of the heart.

ve'nation (vii'neiʃən) – arrangement of veins in a leaf or in the wing of an insect, etc.

ve'neer (ve'niiə) – a very thin piece of fine wood stuck down on to the surface of a cheaper wood.

ve'nereal diseases (ve'niiəriəl) – infectious diseases of the reproductive organs, e.g. syphilis, gonorrhoea.

'vene'section ('veni'sekʃən) – cutting open a vein to let out blood.

ve'netian blind (ve'niiʃən -) – narrow pieces of wood joined with strips of cloth, let down over a window so as to keep out sunlight while letting in air.

'venom ('venəm) – poison of a snake, spider, scorpion, etc.

'venous ('viinəs) – of ↓veins, e.g. venous blood, intravenous injection.

vent (vent) – outlet pipe; outlet opening of the bowel; opening e.g. to let air in or out of a room.

vent-/ (vent-) – wind, e.g. **'ventilator** – instrument for letting air into a room, or letting used air out: also see hyperventilation.

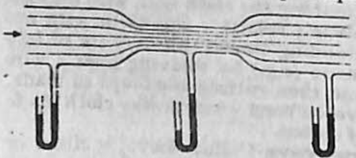
'ventral ('ventrəl) – ("stomach"): of the front of a man's body; of the under-part of an animal (the part which is turned towards the ground).

ventri-/ – ↓ventro-/.

'ventricle ('ventrikl) – a cavity, a hollow place: (1) the two lower cavities in the heart: (from the right ventricle the blood goes to the lungs; from the left ventricle blood goes out to the whole body); (2) a space in the brain.

'ventro-/ ('ventro-) – of the stomach; of the front (or under) part of the body.

Ven'turi tube (ven'tjuuri -) – a tube which shows ↓Bernouilli's principle.



VENTURI TUBE

(Where the speed of flow of a liquid is increased the pressure is decreased.) **Venturi meter** – instrument for measuring flow of gas or liquid by measuring the decreased pressure so caused.

verd-/ (vəəd-) – green, e.g. **'verdigris** – a form of green copper carbonate as seen on dirty copper tubes, copper left in the air, etc. (The name was originally given to copper acetate and is still sometimes so used.)

'verges ('vəədʒiz) – outstanding edges of a sloping roof at the end of a building; grassy edges of a road.

'vermi-/ – worm, e.g. **'vermicide** ('vəəmisaid) – substance which kills worms. **'vermiform** – shaped like a worm, e.g. **vermiform ↓a'ppendix. 'vermifuge** – medicine used to drive out worms from the bowel.

ver'miculite – a form of mica which swells very much when heated: used to make walls keep out sound, also to protect against fire: (trade name).

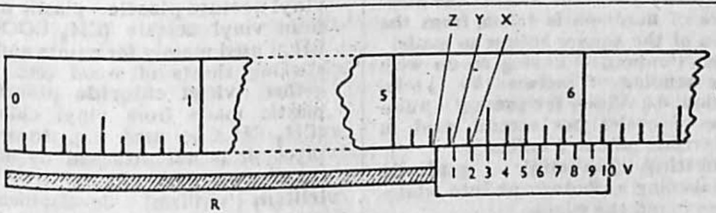
ver'milion (və'miljən) – red mercury sulphide, used as a paint (e.g. the red seen on letter-boxes and post-office cars in England).

'vernal – of the Spring (time of year). **vernal 'equinox** – ("Spring equal-night"), March 21, when the sun at midday is overhead at the equator, and all places have day and night equal in length.

'vernali'zation – Seeds (e.g. of wheat) are wetted and then kept at a temperature of 1°–3° C. for 9 or 10 weeks, then sown: as a result the plants begin to produce seeds earlier, e.g. in about 110–120 (instead of 150) days. (The process has not so far been successful in large-scale use.)

'ver'neuil process ('veə'nəəii -) – way of making artificial jewels by melting alumina (aluminium oxide) in a hydrogen-oxygen flame. ↓corundum.

'vernier ('vəəniə) – part of an instrument used for making very exact measurements. **S** is a measuring **S**cale showing e.g. inches and tenths. **R** is a **R**od whose length is to be measured. **V** is the **V**ernier scale. The 10 divisions of the vernier equal 9 divisions of S; so each vernier division is $\frac{9}{10}$ of a true division. The length of the rod is 5·2 inches + a bit of a division (Z). We look to see where any line of S is exactly opposite any line of V. In the drawing this is so at line 3 of V. Then the little bit X is 1 division − $\frac{9}{10}$ division = $\frac{1}{10}$



VERNIER

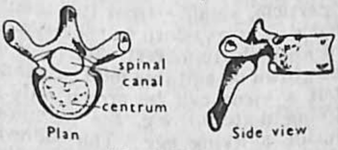
division = 0·01 inch. Piece Y = $\frac{2}{10}$ division = 0·02 inch; the bit Z is $\frac{3}{10}$ division = 0·03 inch. Thus the length of R = 5·2 + 0·03 inch = 5·23 inches. Similarly if line 7 of V were opposite any line of S, the bit to be found would be $\frac{7}{10}$ of a division, and the length would be (e.g.) 5·27. And so on.

'Veronal ('verənəl) – barbitone, a barbiturate sleeping drug: ↓ barbituric acid: (trade name).

ve'rruca (ve'rukə) – Latin word for a wart (small solid harmless growth on the surface of the skin). ↓ cancer.

'version ('vəəʃən) – turning, e.g. of a child in the mother so that the head may be in the right position for birth.

'vertebra ('vəətibrə) – one of the bones (**vertebrae**) of the spine. **'Verte'brata, 'vertebrates** – animals which have spines (backbones) (e.g. mammals, birds, fish; not shellfish, insects, etc. = invertebrates).



VERTEBRA

'vertex ('vəəteks) – the top of the head; the top point of a triangle.

'vertical ('vəətikəl) – standing upright, e.g. **vertical boiler** (as of a small upright steam engine, not as in a railway engine which has a horizontal boiler. **vertical component** – ↓ horizontal.

'vertigo ('vəətigou) – dizziness, feeling as if everything is turning round or moving up and down.

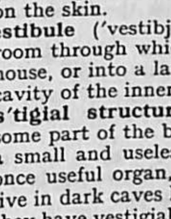
'vesicant ('vesikənt) – substance which causes **'vesicles** = blisters (raised spots filled with clear liquid) on the skin.

'vestibule ('vestibjuul) – (1) small room through which one goes into a house, or into a larger room; (2) the cavity of the inner ear.

ves'tigial structure (ves'tidʒiəl) – some part of the body which is only a small and useless remainder of a once useful organ, e.g. fishes which live in dark caves have no sight, but they have vestigial eyes. In man the tail bones and the ↓ appendix are vestigial.

'veterinary surgeon ('vetrənri) – animal-doctor, person who deals with sick animals.

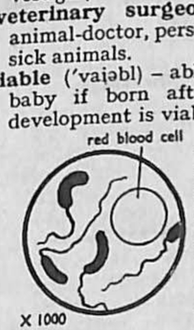
viable ('vai̯əbl) – able to live; e.g. a baby if born after 196 days of development is viable.



VIBRIOS

'vibrios ('vaibriouz) – bacteria shaped like curved rods with a tail for swimming, e.g. those which cause ↓ cholera. (The circle shows a blood-cell magnified 1,000 times.)

vice, vise (vais, -) – instrument used for holding a piece of metal (etc.) in the workshop.



VICE

'Vickers hardness test – A four-sided pointed diamond (diamond pyramid) is pressed into the substance to be tested by a certain weight; the measure of hardness is taken from the area of the square hollow so made.

'**video** ('vidiou) – having to do with the sending of pictures by ↓television, e.g. **video frequency** – number of cycles per second used in television (about 2 million).

vig'netting (vin'jetiŋ) – gradually weakening a photograph into whiteness round the edges.

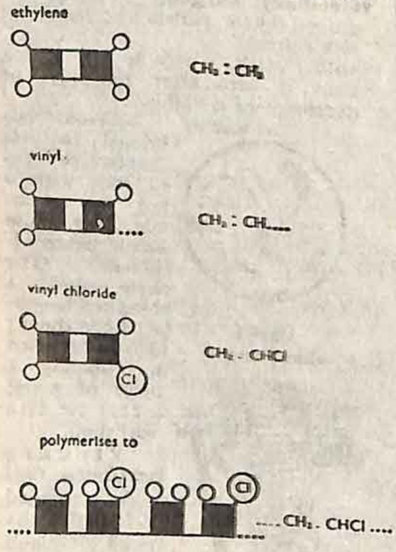
'**villose,** '**villous** ('vilous, 'viləs) – covered with long, loose, thin hairs. **villus** – hair-like outgrowth from a surface, e.g. from the inside of the bowel.

'**Vincent's an'gina** ('vinsənts æn'dʒainə) – inflammation of the throat, caused by bacteria, and possibly brought on by lack of ↓ vitamin B_2.

'**vinculum** ('viŋkjuləm) – line used instead of a bracket in algebra, e.g. $5\overline{x + y} = 5(x + y)$.

'**vinum** ('vainəm) – Latin for wine; a weak solution of a drug.

'**vinyl group** ('vainil) – $CH_2{:}CH–$.

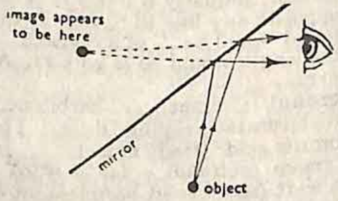


VINYL CHLORIDE PLASTIC

vinyl acetate plastic – plastic made from vinyl acetate ($CH_3.COOCH{:}CH_2$), used mainly for paints and for sticking sheets of wood (etc.) together. **vinyl chloride plastic** – plastic made from vinyl chloride ($CH_2{:}CH.Cl$); used e.g. to make pipes; it is not attacked by acids. ↓polyvinyl.

'**virilism** ('virilizm) – development of male characteristics (e.g. hairy face, deep voice) in a female, owing to a disturbance of the ↓endocrine glands.

'**virtual** ('vəətjuəl) – seeming, but not true, e.g. **virtual image** – image as in a flat mirror, which seems to be in a certain position, but actually no light comes from or goes to that place, and no picture would be formed on a screen placed there.



VIRTUAL IMAGE

'**virulent disease** ('virjulənt) – disease which attacks the body with great speed and energy.

'**virus** ('vairəs) – a disease-causing *particle, smaller than the smallest bacteria (1/75,000th to 1/3,000,000th of an inch diameter). Bacteria can be grown on suitable food substance, but a virus can be grown only on living material, e.g. the membrane inside a living egg. The following diseases are due to a virus: typhus, smallpox, rabies, poliomyelitis, influenza (etc.). *(The virus of a disease of tomatoes has been crystallized, so it must be a chemical substance: but since it can reproduce, it is alive.)

visc-/ – gum, e.g. '**viscid** ('visid) – sticky: ↓viscosity.

'**viscera** ('visərə) – the large organs inside the body – heart, lungs, liver, bowels, etc. '**viscerop'tosis** ('visərɔp'tousis) – falling down (hanging down) of the stomach, bowel and digestive organs owing to weakness of the muscular wall in front of the body.

'viscose ('viskous) – chemical form of cellulose (cellulose sodium xanthate) from which one kind of artificial silk is made.

vis'cosity (vis'kɔsiti) – ↓visc-/: – (loosely) – stickiness of a liquid; (strictly) – the resistance to flow of a liquid or gas caused by the friction (rubbing) of one layer of the liquid (or gas) on another, more slowly moving part. Liquids whose viscosity is high, e.g. thick oil, liquid glue, are **'viscid** or **'viscous. vis'cometer** – instrument for measuring viscosity. ↓poise.

vise – ↓vice.

visi'bility (weather) – clearness (not mistiness) of the air so that things can be seen; the number of yards distance at which things can be seen is stated, or a number-scale is used.

'visual purple ('vizjuəl pəəpl) – chemical substance found in the rod-fibres (part of nerve-endings in the eye by means of which we see in a weak light). Lack of ↓vitamin A causes lack of visual purple and night blindness.

'Vita-glass ('vaitə -) – trade name for glass which (unlike ordinary glass) lets through ↓ultra-violet rays.

'vital ('vaitəl) – of life; **vital statistics** – information about the number of births and deaths in a certain country each year.

'vitamins ('vitəminz) – organic substances necessary, in very small quantities, for the growth and health of living things.

Vitamin A – as in fish-oils and butter; lack causes night blindness, dryness and roughness of the skin.

B_1 – aneurine (thiamine); in the outer part of grain, e.g. of wheat, rice; lack causes ↓beri-beri.

The B group also includes:

riboflavine – in yeast, milk; lack causes skin disorders, photophobia (fear of light);

nicotinic acid – in milk, egg-yolk; lack causes ↓pellagra;

↓pantothenic acid, and other vitamins.

C – ascorbic acid, in lemons, fresh fruit; lack causes ↓scurvy.

D – in fish-liver oils and oil treated with sunlight; lack causes ↓ rickets.

E – in oil from seeds, e.g. wheat, cotton seed; (?) lack causes disorders of child-bearing.

H – biotin; found in liver and yeast; helps growth of yeast and of bacteria; destroyed by eating raw egg-white; lack causes skin disorder. (Sometimes included in the B group).

K – (ordinarily produced within the body, also found in green leaves); lack causes bleeding due to failure in formation of proto- ↓thrombin.

P – in oranges, lemons; (?) lack causes bleeding from the capillaries (small blood-vessels).

There are other vitamins which affect animals but not man.

vitell-/ (vitel-) – having to do with the yolk of egg, e.g. **'vite'llarium** gland which forms egg-yolk. **'vitellin** – a protein of egg-yolk. **'vitelline** ('vitelain), adj.

'vitreous ('vitriəs) – of or like glass, e.g. **vitreous humour** – the clear jelly inside the eye.

'vitriol ('vitriəl) – old name for sulphuric acid and certain sulphates. **blue vitriol** – copper sulphate. **vitriol, oil of vitriol** – sulphuric acid. **white vitriol** – zinc sulphate. **green vitriol** – sulphate of iron (ferrous sulphate).

vi'viparous (vai'vipərəs) – giving birth to young in a developed state, e.g. as by man, cattle, etc., not as eggs, e.g. as by birds, snakes, fishes.

vocal cords ('voukəl) – voice-producing organ in the throat.

vo'coder (vou'koudə) – system of analysing speech sounds into (eleven) different frequencies which are sent separately by (radio) telephone. This has the advantage of narrowing the range of radio-frequencies needed for telephoning.

'volatile ('vɔlətail) – easily evaporated, e.g. petrol and alcohol are volatile; water and thick oil are not volatile.

volt (voult) – unit used in measuring the pressure of electricity. The **voltage** (pressure of electricity) of one cell of a lead-acid storage battery as in a motor-car is about 2 volts; of one cell of an electric flash-lamp (hand lamp), 1½ volts; of house supply, usually about 230 volts. (There is a difference of pressure of 1 volt between two points if 1 joule (work) is done in driving 1 coulomb (quantity of electricity) between the two points.) **vol'tameter** – instrument used for measuring the strength of an electric current by finding the weight of metal deposited on the negative plate by ↓electrolysis. **'volt'meter**–instrument for measuring electric pressure. (Volta, Italian, 1745–1827.)

'volume ('vɔljuum) – space filled by a certain amount (mass) of matter.

'volume control – the instrument in a radio set by which one controls the loudness of the speech, music, etc.

volume resis'tivity – resistance of a block of a substance to the passing of electricity through it from side to side; ohms per cubic centimetre. ↓ohm, specific resistance.

volu'metric a'nalysis (vɔlju'metrik -) – method of finding the weight of a substance in a rock, a mixture, etc. by making the substance into a solution and measuring the volume of another solution of known strength with which it acts; e.g. volume of alkaline solution made neutral by an acid. ↓titration.

'voluntary ('vɔləntəri) – under the control of the will, e.g. **voluntary muscles** – muscles which one can move as one wishes. The heart muscles are **involuntary** muscles.

vo'lute (vɔ'ljuut) – a spiral (carving). **/-volute,** rolled up, rolled in a spiral, e.g. ↓convolution, involution.

'volvulus ('vɔlvjuləs) – twisting of a loop of bowel round itself so that matter cannot pass.

von Laue – ↓Laue.

'vortex ('vɔɔteks) – eddy, whirlpool, liquid spinning round in a spiral; so also air.

'voussoir ('vuswaa) – one of the wedge-shaped stones which form part of an arch.

'vulcanism ('vʌlkənizm) – the action of volcanoes, e.g. in producing rocks.

'vulcanite ('vʌlkənait) – (1) hard ↓vulcanized rubber, as used in old fountain pens, etc.; (newer pens are usually made of plastic); (2) fine grained rocks formed by volcanoes.

'vulcanized rubber ('vʌlkənaizd -) – rubber treated with sulphur compounds so that it becomes tough and keeps its shape: (white, rather transparent "crepe" rubber as used for shoes, is unvulcanized: motor tyres and all rubber things in ordinary use are vulcanized.)

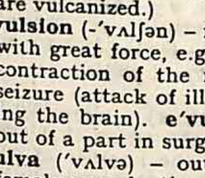
/-vulsion (-'vʌlʃən) – movement made with great force, e.g. **con'vulsion** – contraction of the muscles as in a seizure (attack of illness, e.g. affecting the brain). **e'vulsion** – pulling out of a part in surgery.

'vulva ('vʌlvə) – outer part of the female reproductive organ.

W

W – chemical sign for wolfram (= ↓ tungsten).

w.f. – wrong fount, a letter in printing taken from a different (wrong) set of type, e.g. type.



WALES, WALINGS

wales, 'walings – cross-pieces on a wall of wooden uprights, e.g. holding up a bank of earth.

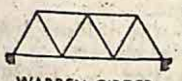
'warble fly ('wɔɔbl -) = botfly – fly which lays eggs in the skin of cattle, so damaging the skins for use as leather.

wards (wɔɔdz) – raised rings inside a lock which prevent the use of a wrong key.

warp (wɔɔp) – the long-ways threads in weaving: (the cross-threads put across in weaving are the weft).

warped (wɔɔpt) – twisted out of shape, e.g. wood by wetness and drying.

warren girder – framework of beams as shown, used (e.g.) for foot-bridges.



WARREN GIRDER

wart (wɔːt) – small, solid (usually harmless) growth on the surface of the skin: for picture ↓ cancer; also called verruca.

'washer ('wɔʃə) – ring of metal, leather, etc. put over a bolt or screw to give a softer or larger pressing surface; or between two pipes to make a better joint.

'wash-leather – yellow, soft, oiled sheepskin leather used for polishing metal.

'Wassermann re'action, Wassermann test ('væsəmæn -) – blood test used to discover whether a person is infected with ↓ syphilis. In every blood there is a substance called the complement. When a poison, e.g. the blood of some other animal B, is put into blood A, the poison (blood B) must fix (combine with) this complement before it can attack blood A. In the test – blood A is mixed with a fixed amount of complement; then a poison (blood B) is put into it. If blood A is infected with syphilis, blood A will fix the complement before the poison B is put in. So there is no complement for B to fix; so B cannot attack A and the blood cells of A remain undamaged (positive Wassermann). If blood A has no infection of syphilis the complement is unfixed. B can fix the complement and attack blood A; so the blood cells of A are broken up. Broken-up blood cells shows *no* infection (negative Wassermann). ↓ complement fixation.

'waste preventer – = ↓ flush for sending water down a **water-closet** (lavatory).

watered silk – ↓ moiré.

'water e'quivalent (- i'kwivələnt) – The water equivalent of a Body is the weight of water, which has the same thermal capacity, i.e. the weight of water which would be heated through the same temperature when supplied with the same amount of heat. Thus, an aluminium block weighing 1,000 grammes needs 200 calories of heat to raise it through 1° C.; 200 calories would heat 200 grammes of water through 1° C.; the water equivalent of the block is 200 grammes.

'water-gas – gas (for burning) made by first making a bed of coal or coke red hot by a flow of air and then passing steam through it. (The steam cools the coal, which must then be heated again. Then steam is passed again, and so on.) In a recent method steam and oxygen are used together. The gas so made consists chiefly of carbon monoxide and hydrogen.

'water-glass – strong solution of sodium silicate, or of potassium silicate, used to make cement waterproof, to preserve eggs; also for cleaning and whitening cloth.

water-lime – = ↓ hydraulic cement.

'watermark – the transparent letters or picture seen when a paper is held up to the light. ↓ dandy-roll, deckle.

water of crystallization – the water which joins with some substances when crystals are formed, e.g. each molecule of copper sulphate joins with 5 molecules of water to form copper sulphate crystals ($CuSO_4 . 5H_2O$).

'watershed – the line of high ground down each side of which water flows on to lower lands.

water-table – the level (boundary) in the ground below which the spaces between the rock particles are filled with water.

water-tube boiler – boiler with tubes containing water, and fire round the tubes, as in ships' boilers: (in railway-engine boilers the fire is in tubes passing through the water).

'waterwall – tubes carrying water round the furnace of a steam-boiler so that the fire may not get so hot as to melt the ash and cause it to stick on to cool parts of the boiler.

watt (wɔt) – unit for measuring the rate at which energy (usually electrical energy) is used up (e.g. by a lamp), or produced (e.g. by a generator). One watt is equal to 1 ↓ joule of energy per second; 1,000 watts = about 1⅓ horse-power. (The number of watts can be calculated by multiplying the number of amperes by the number of volts.) A small (bowl) electric radiator or an electric iron (for clothes) uses about 500 watts. (British, 1736–1819.)

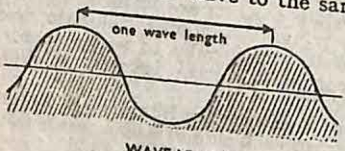
watt-hour – the amount of electrical energy taken in one hour by an instrument which uses energy at the rate of one watt. Number of watt-hours = number of watts × number of hours. 1,000 watt-hours (= 1 kilowatt-hour) is called a Board of Trade unit.

wattle and dab (daub) ('wɔtl -) – form of wall for houses: a wooden frame with light wooden cross-bars covered over with plaster. **wattles** – thin strips of wood woven to make a framework.

'waveband – a certain range of wavelengths, e.g. the medium band on radio sets is from 200 to 550 metres.

wave guides – metal tubes used instead of wires in electric circuits carrying very high frequency currents (as in ↓ radar).

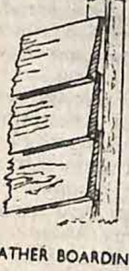
'wavelength – length measured from any point on one wave to the same point on the next wave; the wavelengths of radio waves are usually measured in metres; the wavelengths of light waves are measured in ↓ Angström units.



WAVE-LENGTH

weal (wiil) – raised white area with red edges on the skin, e.g. as the result of a blow.

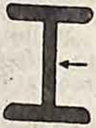
'weather boarding – wedge-shaped boards with each thick edge lying over the thin edge of the next lower board, used on the outside of a house.



WEATHER BOARDING

'weathering (of rocks) – breaking up and changing of rocks as a result of rain, cold, sun, etc.

web (of a beam) – the thinner centre part, as shown.



WEB

'Weber - 'Fechner Law ('veibə 'feknə) – The smallest noticeable change in a sound is proportional to the loudness of the sound: it takes a bigger change in a loud sound to be noticed than in a faint sound; so the scale for measuring loudness must be logarithmic. ↓ phon.

weft – threads thrown across in weaving: (the long-ways threads are the warp).

'Wegener theory ('veɡənə) – theory that the continents of the Earth used to be close together, but, in time, moved apart into their present positions; it is useful in explaining the similarity of shape of the coast-lines of Africa and S. America, also the similarity of certain animals in S. America and S. Africa, but there are (geological) reasons against it.

weigh (ship) – lift the anchor. **under weigh** – just lifting or having lifted the anchor off the ground (but perhaps not moving).

weighting – way of finding an average of figures (measurements), etc. when some of the figures carry greater "weight" than others or are more reliable.

Example:–

Day	1	2	3	4
Price of goods per ton	£10	£11	£13	£14

The average price per ton seems to be £12. But the amounts sold were:–

Day	1	2	3	4
Tons	10	40	100	50

To find the correct average, the prices 10, 11, 13, 14 must be multiplied by the amounts sold and the total divided by the total number of tons sold:–

$$\frac{100+440+1300+700}{200}=\pounds 12{\cdot}7$$

Weighting is also used when there is

reason to believe that one measurement is more to be trusted than another, e.g.–

Measure	20	21	19	22
Trustworthiness	1	3	2	1

Weighted mean =

$$\frac{(1\times 20)+(3\times 21)+(2\times 19)+(1\times 22)}{1+3+2+1}$$

$= 20{\cdot}4$.

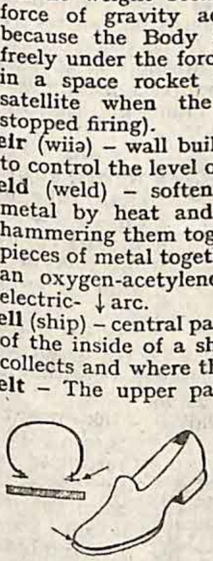
weightlessness – a state in which a Body (e.g. human being or animal) has no weight because there is no force of gravity acting on it or because the Body is falling quite freely under the force of gravity (as in a space rocket or artificial ↓ satellite when the rockets have stopped firing).

weir (wiiə) – wall built across a river to control the level of the water.

weld (weld) – soften two pieces of metal by heat and join them by hammering them together; melt two pieces of metal together by means of an oxygen-acetylene flame, or by electric-↓arc.

well (ship) – central part of the bottom of the inside of a ship where water collects and where the pumps are.

welt – The upper part of a shoe is sewn (from the inside) on to a narrow strip of leather (the welt), and the welt is sewn (from the outside) on to the thick base of the shoe (the sole).

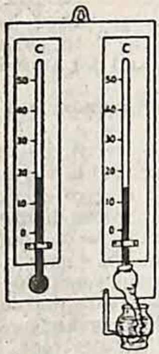


WELT

wen – smooth raised elastic growth on the skin blocking an oil-gland, e.g. on the face or head.

Weston cell – electric cell (made of cadmium, mercury, and their sulphates) which has a very steady voltage (pressure) of 1·0183 volts at 20° C. Used as a standard voltage.

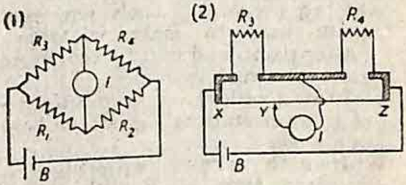
wet and dry bulb – two thermometers, one having a wet cloth round its bulb which (owing to evaporation) causes it to show a lower temperature: the difference between the two temperatures is a measure of the dryness (or wetness) of the air.



WET AND DRY HYGROMETER

'Wheatstone bridge ('wiitstən -) – instrument for measuring electrical resistance. Diagram (1) shows an arrangement of four resistances R_1, R_2, R_3, R_4, a battery B and an Instrument for measuring current.

Suppose $R_1 = 6$ ohms; $R_2 = 2$ ohms and $R_3 = 12$ ohms; $R_4 = 4$ ohms. Whenever $R_1 \div R_2 = R_3 \div R_4$ no current flows through I; (here $\frac{6}{2} = 3$ and $\frac{12}{4} = 3$). Suppose $R_1 = 6$, $R_2 = 2$, $R_3 = 12$ but we do not know R_4. If we find that no current flows through I we can calculate R_4 – it must be 4 ohms. Diagram (2) shows a Wheatstone bridge. The wire XZ is a straight resistance wire. A loose wire from the instrument can be put on to XZ dividing it into two parts XY and YZ. These two parts XY and YZ correspond to R_1 and R_2 in diagram (1). R_3 is a resistance of known size; R_4 is the resistance to be measured. We move the loose wire along XZ until I shows no current. The resistances of the pieces XY, YZ are represented by their lengths. Then $\frac{XY\ (=R_1)}{YZ\ (=R_2)} = \frac{R_3}{R_4}$. Hence we can calculate R_4.



WHEATSTONE BRIDGE

whip a rope – bind the cut end of a rope round with string so as to keep the fibres close together.

'whipcord – cloth with a number of very thick longway threads (warp threads) causing large raised lines from end to end of the cloth, as used for strong clothes and for covering motor-car seats, etc.

white damp – carbon monoxide (CO) in a coal-mine.

White Dwarf star (- dwɔɔf -) – star whose mass is about that of the sun, whose temperature is greater than that of the sun, but whose diameter is far less. So it must be composed of very dense substance – such that 1 cubic foot of it would weigh several hundred tons. It is possible that such stars consist of tightly packed nuclei of atoms without their electrons.

white lead – lead carbonate as used for white paint.

white metal – alloy containing tin, antimony, lead (and sometimes also copper, zinc); used for bearings.

'whiting ('waitiŋ) – finely powdered chalk used to make whitewash (water-paint) and putty (used to fix glass into window-frames).

'whitlow ('witlou) – a deep infection of a finger starting e.g. at the base of a finger-nail.

'Whitworth screw ('witwəəθ) – a standard type of English screw-thread used for medium and large screws in engineering. The distance between the threads depends upon the diameter of the bar from which the screw is cut.

w'hooping-cough ('huupiŋ-kɔf) – infectious disease of children, so called because of the noise in drawing in a breath in the attacks of coughing: caused by a bacterium; also called pertussis.

whorl (wɔɔl) – one turn of a spiral, e.g. of a spiral sea-shell; (plant) – a ring of parts (e.g. petals, leaves) all joining the stem at about the same level.

'Widal test ('viidəl -) – a test to discover whether a person has ↓typhoid fever: a drop of his blood-*serum is added to liquid containing typhoid bacteria; if the bacteria agglutinate (join together in masses) it is a sign that the disease is typhoid: *(clear liquid of blood).

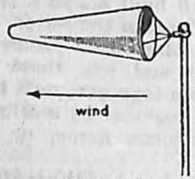
'Wiedemann-'Franz law ('viidemæn-frænts -) – an exact statement of the fact that the power of a metal to conduct heat and the power to conduct electricity are related; e.g. copper, a good conductor of heat, is also a good conductor of electricity.

'Wien's law (viin -) – ↓displacement.

'Wigner energy ('vignə -) – energy made and stored in a material by atomic radiations, especially in graphite when it is used (as a moderator) in a ↓reactor.

'Wimshurst ma'chine ('wimshəəst -) – machine consisting of revolving glass plates. Metal pieces are fixed to the plates; brushes collect ↓static electricity from these metal pieces.

winch – small crane, e.g. worked by hand.

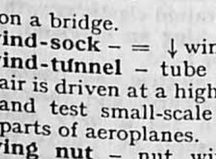


WIND-CONE

wind - cone, wind-sock – cloth tube used to show the strength and direction of the wind on an airfield.

winding ('waindiŋ) (of an electric motor, etc.) – the fine insulated wires of which the coils are made.

'windlass ('windləs) – instrument as shown used for raising or pulling, e.g. raising a bucket from a well.



WINDLASS

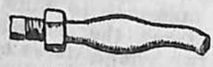
'wind load – the force of the wind acting, e.g. sideways, on a bridge.

'wind-sock – = ↓wind-cone.

'wind-tunnel – tube through which air is driven at a high speed to study and test small-scale aeroplanes, or parts of aeroplanes.

'wing nut – nut with outstanding pieces so that it can be screwed on to the bolt with the finger and thumb.

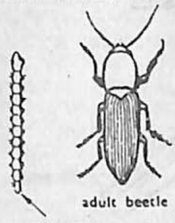
wiped joint ('waipt -) – The end of one lead pipe is opened out; the end of the other pipe is put inside it and held in place with an instrument;



WIPED JOINT

soft solder (tin-lead alloy) is spread smoothly over the joint.

'wire-worm – larva of a beetle which lives under grass. When grass-land is ploughed up the wire-worms often cause great damage to crops.



WIRE-WORM

'wolfram ('wulfrəm) = ↓ tungsten.

'wood alcohol, 'wood spirit = ↓ methyl alcohol.

wooden tongue – disease of cattle causing inflammation of the tongue, mouth, stomach, caused by a fungus. ↓ actinomycosis.

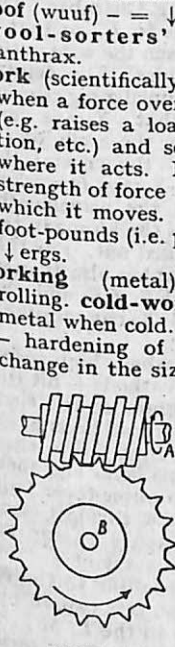
Wood's metal – bismuth (68%) with tin and cadmium; it melts at a very low temperature; used in safety instruments on boilers and in instruments for automatically turning on water in a burning building.

woof (wuuf) – = ↓ weft.

'wool-sorters' disease = ↓ anthrax.

work (scientifically) – Work is done when a force overcomes a resistance (e.g. raises a load, overcomes friction, etc.) and so moves the point where it acts. It is measured by strength of force × distance through which it moves. Common units are foot-pounds (i.e. pounds × feet) and ↓ ergs.

working (metal) – hammering, rolling. **cold-working** – hammering metal when cold. **work-hardening** – hardening of metal due to the change in the size and arrangement of crystals in the metal caused by hammering, etc.



WORM GEAR

worm gear – spiral (helical) gear wheel driving another gear wheel as shown.

'worsted ('wustid) – (1) wool yarn (thread for weaving) made of long fibres only, carefully combed parallel, and spun into a very even, smooth (not hairy) yarn; (2) cloth made from such yarn.

wort (wəət) – In making beer, germinated grain (seeds, e.g. barley, which have begun to grow) is boiled in water to get out the malt sugar, etc.: this liquid (= wort) is drawn off the grain and fermented to change the sugar into alcohol.

wow – ↓ flutter.

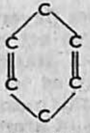
'Wratten filters ('rætən -) – Trade name for a set of transparent coloured slides (glasses) used e.g. in front of the lens of a camera so as to cut out or lessen light of a certain colour.

wrench (renʃ) – tool used for tightening nuts. **pipe-wrench** – tool for turning a pipe round so as to screw it into another pipe: for picture, see pipe.

'wrought 'iron (rɔɔt) – very pure iron mixed with a little slag (iron oxide or silicate), rolled and hammered after it leaves the furnace. The slag forms fibres in the iron making it different from the crystallized metal as in cast iron. Wrought iron resists rust and is very tough but can be hammered into shape; it is used for pipes, chains, etc.

X

xanth-/ (zænθ) – yellow, e.g. **'xanthene dyes** – dyes (chiefly yellow or red) containing the ring of atoms as shown. **'xanthophyll** – yellow colouring matter of leaves when the green (chlorophyll) has gone.



XANTH

'xanthine – a dihydroxy-purine: substance formed by the breakdown of proteins in the body; it is oxidized to uric acid which is passed out in the urine.

'xantho'pterin – ↓ pterin.

X 'chromosome – First see chromosome. The female reproductive cell (ovum) in Man contains 23 chromosomes; of these, one is the X chromosome; the X chromosome carries the sex character. Of the male reproductive cells (spermatozoa) half the cells have an X chromosome; half of the spermatozoa have a different chromosome, Y. If an X-containing sperm meets an ovum, the result is X + X, and this produces a female offspring; if a Y sperm meets an ovum, the result is Y + X, and the offspring is male.

ʹxeno-/ (ʹzeno-) – foreign, of another kind, e.g. **ʹxenolith** – small piece of rock of one kind contained in a mass of rock of another kind.

ʹxenon (ʹzenɔn) – rare gas (found in very small amounts in the air), used in a ↓discharge lamp to give very short flashes of light (1/1,000 second or less) for high-speed photography.

ʹxero-/ (ʹzero-) – dry, e.g. **ʹxeroʹderma** – disease causing dry plates on the surface of the skin. **ʹxerophʹthalmia** – dry, dull condition of the eye, due to lack of ↓vitamin A. **ʹxerophyte** – plant which grows in a dry place.

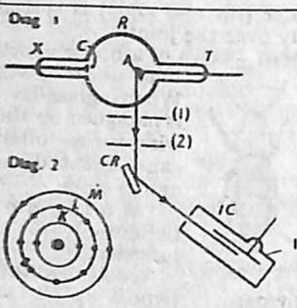
xeʹrography (zeʹrɔgrəfi) – "dry" photography using an electrically charged plate (e.g. selenium) which loses its charge at places where light falls on it. Powder, which is then scattered on, sticks only where the charge remains and so shows the picture.

xiph-/ (ʹzif-) – ("sword") – e.g. **ʹxiphoid** – sword-shaped. **ʹxiphisʹternum** – the lowest part of the breast-bone.

X-ray aʹnalysis – The planes (layers) of atoms or ions in crystals act on X-rays as a ↓diffraction grating (they spread the rays out as in a spectrum): it is possible by this means to study the arrangements of atoms (ions) in the crystal. ↓Laue, Moseley.

X-rays – waves like radio waves or light waves, but with very short wavelengths (from 0·01 to 50 A.U. = from $\frac{1}{10000}$th of a millionth to $\frac{1}{2}$ millionth of a centimetre). X-rays are sent out when fast-moving electrons hit a solid plate (↓X-ray tube). They can pass through substances through which light cannot pass, e.g. wood, flesh, and can be used for taking photographs to show bones and organs inside the body.

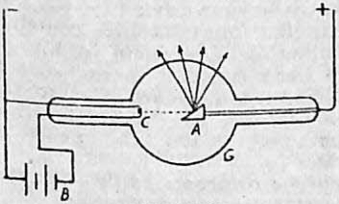
X-ray spectrometer – instrument for measuring the wavelengths of X-rays. See diagram 1. *XRT* is a source of X-rays (**X-R**ay **t**ube). The rays pass through slit 1 and slit 2 on to a **CR**ystal (e.g. a crystal of rock salt). The network arrangement of atoms in the crystal causes the rays to be spread out (compare the spreading out of light rays into a spectrum by a ↓diffraction grating). *IC* is an ↓**I**onizing **C**hamber. The rays ionize the gas in *IC* so that a current flows between the wire in the middle and the sides. The crystal and *IC* are turned until a big current flows, showing that X-rays are entering *IC*. From the angle of *IC* and the nature of the crystal the wavelength of the X-rays is worked out. Or, knowing the wavelength, the arrangement of the atoms in the crystal can be worked out. For this purpose a photographic film is used instead of *IC*. *XRT*, *CR* and the film then form an **X-ray camera** for crystal studies.



X-RAY SPECTROMETER

X-rays are caused when high-speed electrons from the cathode *C* hit the anode *A*. See diagram 2: the electrons in the *K* (innermost) layer of an atom have least energy. If an electron is hit out of this layer and then an electron from an outer layer falls back to take its place, this last electron gives out its spare energy as X-rays. So there is a set of X-rays caused by electrons falling to the *K* layer. There are also sets caused by electrons which fall to the *L*, *M* . . . layers. Each element has its own sets of *K*, *L*, *M*, rays. (The rays of one kind (e.g. *K* rays) of a heavy element have more energy (and higher frequency) than those of a light element.) By making the anode of different elements, or covering it with different elements, the measurements of the X-rays enable the scientist to learn about the electron layers in the atoms.

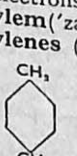
X-ray tube – instrument for producing X-rays. The drawing shows the Coolidge X-ray tube. *G* is a glass vessel from which air has been pumped out. *C* (the cathode) is a little coil of wire which is heated by the current from the battery *B*. *A* (the anti-cathode or anode) is a block of tungsten (wolfram). *C* and *A* are joined to the ⊖ and ⊕ ends of a strong direct current electric generator. The hot cathode sends out electrons. The high voltage between *C* and *A* makes the electrons travel quickly across the tube and hit the anti-cathode. X-rays are produced by this hitting of *A* by the electrons.



X-RAY TUBE

'xylem ('zailem) – wood-tissue in a plant.

'xylenes ('zailiinz) – liquids found in coal tar. (Benzene in which the place of 2 of the hydrogen atoms of the molecule is taken by methyl (CH_3) groups.) There are 3 xylenes which differ in the positions of the CH_3 groups.



XYLENE

'xylenol ('zailenɔl) – substance similar to ↓phenol but made from xylene instead of benzene, used instead of phenol in plastics of the phenol-formaldehyde class, e.g. in making brake-shoes (part of a brake which presses on the wheel).

'xylonite ('zailənait) – celluloid (plastic made from wood) used, e.g., for photographic films.

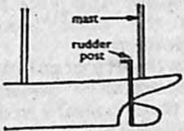
Y

Y alloy, Y metal (wai 'ælɔi) – alloy of aluminium with copper, nickel, magnesium; it becomes harder after it has been worked; ↓age hardening.

yarn – thread as used for weaving; thread as used for making ropes.

'yawing (ship, aeroplane) ('jɔɔiŋ) – swinging, e.g. from side to side, away from the right course.

yawl (jɔɔl) – sailing ship with one high mast, and one smaller mast (carrying only one sail) behind the rudder-post.



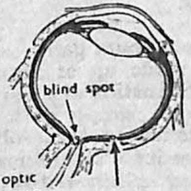
YAWL

yaws (jɔɔz) = **fram'boesia** – disease found in Africa and the West Indies; it causes swellings with a hard yellow outer surface (crust) on the skin; due to a ↓spirochaete.

yeast (jiist) – living fungus-like substance used to make the holes in bread; also for causing the change from sugar into alcohol as in making beer. Yeast produces enzymes (proteins which in small amounts cause or hasten a large chemical change without themselves being changed: ↓catalyst): these enzymes cause the chemical changes in the sugar.

yellow fever – disease found in S. America and the West Indies, spread by a mosquito: it causes inflammation of the kidneys, liver and stomach, a yellow skin and black vomit.

yellow spot = 'macula 'lutea, – spot in the retina (nerve endings of sight at the back of the eye) where sight is clearest.



YELLOW SPOT

yield point – in testing the strength of a metal, the point (strength of pull) at which the metal continues to stretch without any increase of load (pull).

/-yl – (1) an organic (carbon compound) group of atoms with a valency (joining power) of 1, e.g. methyl,

CH_3–, phenyl C_6H_5–, acetyl $CH_3.CO$–; (2) an inorganic group of atoms (one of which is oxygen) which acts like a metal (e.g. like silver) and forms the electrically positive ⊕ part of a compound, e.g. in nitrosyl chloride, NOCl, NO acts in this way; compare silver chloride, AgCl. (The chloride is the electrically negative part in both cases.)

yoke (jouk) – bar used to join two things together, e.g. cattle or horses in a cart; anything so shaped, e.g. the top bar of a rudder; the piece of iron which joins the poles (end-pieces) of an electromagnet.

'Young-'Helmholtz theory of colour vision ('jʌŋ-'helmholts) – theory that the eye sees three colours (red, green, blue-violet) and that all other colours are made up by mixtures of these three colours (as in colour photography).

'Young's inter'ference – ↓interference-bands produced by light which comes from two close, very thin slits.

'Young's 'modulus (- 'mɔdjuləs) – the *elasticity of a substance (e.g. a metal) as measured thus:–

$$\frac{\text{load}}{\text{area of cross-section}} \div \frac{\text{stretch}}{\text{original length}}$$

*(elasticity = power of a Body to return to its usual shape after being stretched, compressed, twisted, etc.). ↓modulus.

Z

Zam'boni pile (zæm'bouni pail) – an electric battery made up of about 2,000 cells, each consisting of a small plate of zinc, paper, copper with a weak acid. It produces a high voltage, low amperage for a short time; used for producing ↓infra-red rays for seeing at night in war.

'Zeeman effect ('ziimən -) – When a source of light is placed in a strong magnetic field, the lines of the spectrum of the light are split up. The magnetic field of a star can be measured by means of this effect.

'zein (zii.in) – a protein in maize (Indian corn); used for giving paper a glass-like surface.

'zenith ('zeniθ) – point in the sky (thought of as the inside of a ball) straight above one's head.

'zeolites ('ziiolaits) – glassy minerals consisting of silicates of aluminium and another metal (e.g. calcium, sodium) and a large proportion of water. Treated with acids they partly dissolve leaving the silica in a jelly-like form. Zeolites containing sodium and potassium readily give up these elements in exchange for calcium, and so are used to take calcium out of "hard" (calcium-containing) water and make the water "soft".

'Zernicke microscope ('zəənikə -) = ↓phase contrast microscope.

zero energy reactor – ↓reactor which has not been built to produce energy and, in fact, produces very little energy.

zero-point vibration – that movement of atoms in a gas or liquid which does not depend on heat and goes on even at absolute zero (−273° C.): it is greater in lighter than in heavier molecules.

zinc (ziŋk) – blue-white metal element; used (e.g.) in protecting steel (↓galvanize) and in making alloys (especially brass, = copper + zinc).

'zinc blende – zinc ore (zinc sulphide); also called sphalerite.

'zinco – plate for printing pictures (e.g. all the pictures in this book); made by "printing" (by light) the picture on to a zinc plate covered with a light-sensitive substance, and eating away the unaffected parts with nitric acid.

zir'conium (zəə'kouniəm) – metal element; used as a powder in flash bulbs (for taking photographs at night) and in certain steel alloys. Zirconium oxide is used for the roof or lining of furnaces for melting precious metals and to give a white enamel (glass-like) surface on metals. Zirconium may become important in building ↓reactors, as it is strong, can be alloyed with iron, but does not absorb neutrons. Zirconium +

magnesium alloy is used for the wings of certain aeroplanes.

Zn – chemical sign for zinc.

'Zodiac ('zoudiæk) – a strip of the sky (through the middle of which the sun seems to travel during the year) divided into twelve parts: Ram, Bull, Twins, Crab, etc.

/-**'zoic** ('-zouik) – of life, e.g. A'zoic (no life) era (age) – 800 million years ago: 'Protero'zoic (before life) – 500 million years ago: 'Palaeo'zoic (older forms of life) – 175 million years ago: 'Meso'zoic (middle forms of life) – 50 million years ago; 'Caino'zoic (recent forms of life).

/-**'zoite** (-'zouait) – living organism, e.g. **'sporo'zoites** – thread-like spore-organisms injected by the bite of a mosquito into the blood; they become **'tropho'zoites** (feeding organisms) in the tissue cells, and appear in the blood cells about 11–15 days later; they then divide up into **'mero'zoites** (part organisms) and break out from the blood cells.

zone refining – driving impurities out of a material by passing it through a heater. As the hot area (zone) passes along the length of the material the impurities are driven to one end.

zoo-('zou.o-/–of animals, e.g. **zo'ology** – the study of animals; **'zoo'plankton** – small animals in the sea which are the food of fish.

zoom lens (zuum -) – lens of a television or ciné camera which can be gradually adjusted so as to give close-up and more distant views.

'zooming ('zuumiŋ) – using the forward momentum (force of movement) of an aeroplane so as to gain height.

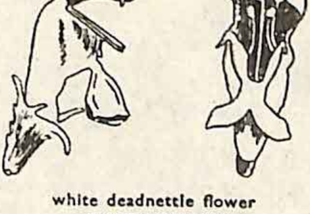
'zoospore ('zou.ospɔɔ) – a spore (non-sexual reproductive cell) able to swim about.

zoster – ↓ herpes.

Zr – chemical sign for ↓ zirconium.

zyg-/ (zaig-) – a ↓ yoke: **zy'goma** – bridge of bone just in front of the ear to which the jaw-muscles are fixed. **'zygomatic,** adj., like a yoke, e.g. **'zygo'matic bone.**

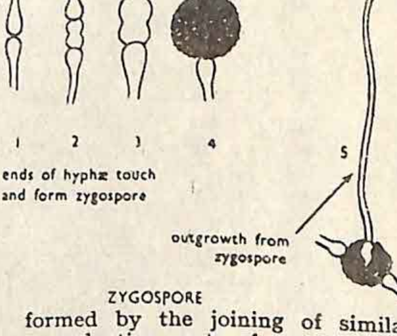
'zygo'morphic flower – flower which is built on an H-plan, i.e. it is symmetrical (balanced) only about a middle vertical line, e.g. orchid, deadnettle.



white deadnettle flower
ZYGOMORPHIC

'Zygomy'cetes (-mai'siitiiz) – group of fungi which reproduce by ↓ zygospores (formed by two hypha (tubes) touching, becoming one, then separating from the fungus): the group includes many common moulds (spreading fungus-growths), such as those on damp bread, moist leather, etc.

'zygospore – a thick-walled spore which rests before growing; it is formed by the joining of similar reproductive parts of certain algae and fungi, e.g. ↓ zygomycetes.



ZYGOSPORE

'zygote – cell formed by the union of two sex cells; a fertilized egg-cell.

zym-/ (zaim-) – ferment, e.g. **'zymase** – *enzyme of yeast which produces alcohol from sugar: *(protein which causes large chemical actions without itself being changed: ↓ catalyst).
'zymogen – substance which is changed into an enzyme.

APPENDIX

TABLE OF CHEMICAL ELEMENTS

This table gives the names of 92 chemical elements, their symbols, atomic numbers and atomic weights (simplified, in most cases, to the nearest whole numbers). A few elements have alternative names (as shown in brackets).

*These elements, like the transuranic elements (see below), have been produced by artificial means and do not occur naturally (at least, not in any appreciable amount).

Element	*Symbol*	*Atomic Number*	*Atomic Weight*
Actinium	Ac	89	227
Aluminium	Al	13	27
Antimony	Sb	51	122
Argon	A	18	40
Arsenic	As	33	75
*Astatine	At	85	—
Barium	Ba	56	137
Beryllium (Glucinium)	Be (Gl)	4	9
Bismuth	Bi	83	209
Boron	B	5	11
Bromine	Br	35	80
Cadmium	Cd	48	112
Caesium	Cs	55	133
Calcium	Ca	20	40
Carbon	C	6	12
Cerium	Ce	58	140
Chlorine	Cl	17	35½
Chromium	Cr	24	52
Cobalt	Co	27	59
Copper	Cu	29	63½
Dysprosium	Dy	66	162½
Erbium	Er	68	167
Europium	Eu	63	152
Fluorine	F	9	19
Francium	Fr	87	223
Gadolinium	Gd	64	157
Gallium	Ga	31	70
Germanium	Ge	32	73
Gold	Au	79	197
Hafnium	Hf	72	179
Helium	He	2	4
Holmium	Ho	67	165
Hydrogen	H	1	1
Indium	In	49	115
Iodine	I	53	127
Iridium	Ir	77	192
Iron	Fe	26	56
Krypton	Kr	36	84
Lanthanum	La	57	139
Lead	Pb	82	207
Lithium	Li	3	7
Lutetium (Cassiopeium)	Lu (Cp)	71	175
Magnesium	Mg	12	24
Manganese	Mn	25	55
Mercury	Hg	80	201
Molybdenum	Mo	42	96
Neodymium	Nd	60	144
Neon	Ne	10	20
Nickel	Ni	28	59
Niobium (Columbium)	Nb (Cb)	41	93
Nitrogen	N	7	14
Osmium	Os	76	190
Oxygen	O	8	16
Palladium	Pd	46	107
Phosphorus	P	15	31
Platinum	Pt	78	195
Polonium (Radium F)	Po	84	210
Potassium	K	19	39
Praseodymium	Pr	59	141
*Prometheum	Pm	61	—
Protactinium	Pa	91	231
Radium	Ra	88	226
Radon (Niton)	Rn (Nt)	86	222
Rhenium	Re	75	186
Rhodium	Rh	45	103
Rubidium	Rb	37	85½
Ruthenium	Ru	44	101
Samarium	Sm	62	150½
Scandium	Sc	21	45
Selenium	Se	34	79
Silicon	Si	14	28

Element	*Symbol*	*Atomic Number*	*Atomic Weight*
Silver	Ag	47	108
Sodium	Na	11	23
Strontium	Sr	38	88
Sulphur	S	16	32
Tantalum	Ta	73	181
*Technetium	Tc	43	—
Tellurium	Te	52	128
Terbium	Tb	65	159
Thallium	Tl	81	204
Thorium	Th	90	232
Thulium	Tm	69	169
Tin	Sn	50	119
Titanium	Ti	22	48
Tungsten (Wolfram)	W	74	184
Uranium	U	92	238
Vanadium	V	23	51
Xenon	Xe	54	131
Ytterbium	Yb	70	173
Yttrium	Y	39	89
Zinc	Zn	30	65
Zirconium	Zr	40	91

TRANSURANIC ELEMENTS

Atomic Number	*Element*	*Symbol*
93	Neptunium	Np
94	Plutonium	Pu
95	Americium	Am
96	Curium	Cm
97	Berkelium	Bk
98	Californium	Cf
99	Einsteinium	E
100	Fermium	Fm
101	Mendelevium	Mv
102	Nobellium	No

BRITISH AND METRIC WEIGHTS, MEASURES AND TEMPERATURES

Weights and Measures

1 centimetre = 0·39 inch
1 metre = 1·09 yards
1 gramme = 0·035 oz.
1 kilogramme = 2·2 lb.
1 litre = 1·76 pints

Temperatures

Centigrade	Fahrenheit
100°	212°
90	194
80	176
70	158
60	140
50	122
40	104
30	86
20	68
10	50
0	32

Prefixes

micro- = one millionth
milli- = one thousandth
centi- = one hundredth
deci- = one tenth
kilo- = one thousand
mega- = one million

PRONUNCIATION

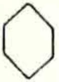
The pronunciation shown is that current among English professional users of the word as it would be spoken in a sentence

i *as in* fit (fit)	ii *as in* feet (fiit)
e ,, ,, fed (fed)	
æ ,, ,, fat (fæt)	
ɔ ,, ,, fog (fɔg)	aa ,, ,, far (faa)
o ,, ,, obey (obei)	ɔɔ ,, ,, fall (fɔɔl)
u ,, ,, foot (fut)	
ʌ ,, ,, fun (fʌn)	uu ,, ,, food (fuud)
ə ,, ,, the reason (ðə riizən)	əə ,, ,, fur (fəə)
ai *as in* five (faiv)	aiə *as in* fire (faiə)
ei ,, ,, fate (feit)	eə ,, ,, fair (feə)
ɔi ,, ,, foil (fɔil)	iə ,, ,, fear (fiə)
ou ,, ,, foam (foum)	uə ,, ,, tour (tuə)
au ,, ,, fowl (faul)	auə ;, ,, sour (sauə)

ŋ *as in* long (lɔŋ)
θ ,, ,, thin (θin); ð *as in* then (ðen)
ʃ ,, ,, ship (ʃip); tʃ ,, ,, chin (tʃin)
ʒ ,, ,, measure (meʒə); dʒ *as in* judge (dʒʌdʒ)
j ,, ,, tube (tjuub), yoke (jouk)—a semi-vowel

Stress—The sign ′ comes **before** the stressed syllable, *e.g.* pro′nunci′ation—the stress is on ***-nun-*** and ***-a-***.

CHEMICAL SIGNS

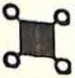
C	carbon	N	nitrogen
Ca	calcium	O	oxygen
Cl	chlorine	Zn	zinc
H	hydrogen	CO_2	carbon dioxide
C_6H_6, *or* 	For explanation see Benzene ring.	H_2O	water
		$2H_2O$	two molecules of water
		→	becomes, produces

For a complete table of the chemical elements and their symbols see Appendix (p. 411)

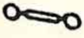
In explanations of the simplest chemical ideas the following five signs are used for the benefit of readers who are unaccustomed to chemical letter-formulae and prefer to think pictorially. Such readers may also find it helpful and interesting where ordinary chemical letter-formulae are given, to translate them into these figures:—

1. ■ an atom of carbon: (it has a joining power of 4).

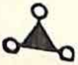
2. ○ an atom of hydrogen: (joining power of 1).


one carbon atom with four hydrogen atoms, CH_4.

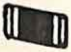
3. ▬ an atom of oxygen: (joining power of 2).

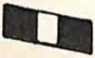

HOH ($=H_2O$), water

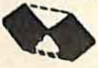
4. ▲ an atom of nitrogen: (joining power of 3).


an atom of nitrogen with three hydrogen atoms, NH_3.

5. ★ sometimes nitrogen apparently has a joining power of 5.


here two oxygen atoms are doubly joined to a carbon atom, i.e. O:C:O.


two carbon atoms doubly joined (as in ethylene $H_2C:CH_2$).


so also three joins (as in acetylene HC⋮CH).

For further explanation, see Valency.

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